COAL AGE

FLOYD W. PARSONS, *Editor.*

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CIRCULATION OF THIS ISSUE 11,500

None sent fsee regularly, no returns from news companies, no back numbers

Some Changes That Will Benefit Coal Age Readers In 1913

This year the make-up of Coal Age will be a little different from that of 1912

The reading matter type will be larger and set in two columns to the page instead of three—easier to read.

The synopsis of important articles formerly set in black faced type in box heading will hereafter appear as the first paragraph, set in italics.

We intend to make the paper more *useful*. To this end the Contents will appear on the *first* page inside the cover and the principal articles will be summarized there in such a way that a busy man can pick out just what he wants and turn to it.

Indeed, if this page alone is read you will at least have an outline of the principal events in the world of coal mining and coke manufacture.

Another thing, this index is so arranged that each subject can be cut out for a card index when so desired.

The second page will be devoted to the publisher's announcements, the talks by the advertising editor, etc.

The Alphabetical Index to Advertisers will always appear on the last page in the paper next the cover, and the Alphabetical List of Articles that are offered for sale to coal mines and coke manufacturers will appear just ahead of the list of advertisers together with the names of those advertising them.

All of which makes it easier for the reader to use this index in seeking names of articles wanted or those making them.

The mining news will be set in smaller type thus offsetting the loss of words by the use of larger type in the other departments.

The editorial page will be found at the end of the general reading matter, about the twentieth page from the front.

Our whole aim for 1913 is to make Coal Age more attractive, more interesting, more valuable to the readers, than ever before

The editorial staff is most efficiently organized to "edit the paper from the field," and the list of regular correspondents now covers the entire coal industry of this as well as other countries.

As during the past year we will publish the vital news of the whole field first and best, and strive untiringly to give Coal Age readers the biggest three dollars' worth ever offered to the coal and coke industry.

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Prices and Specifications On Jeffrey Standard Types Will Appear Frequently

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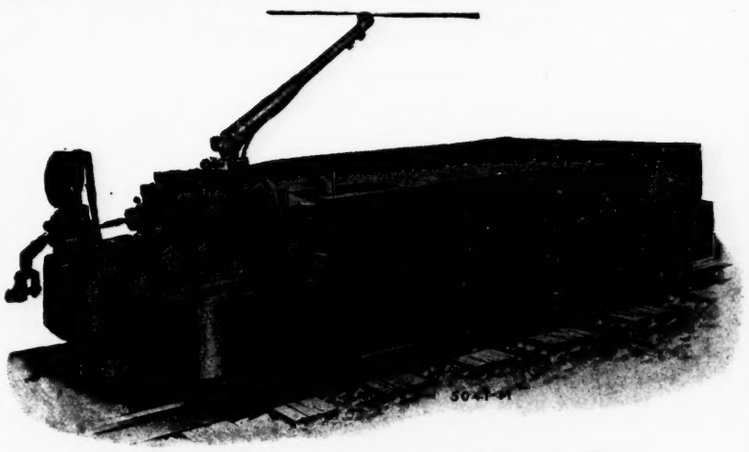

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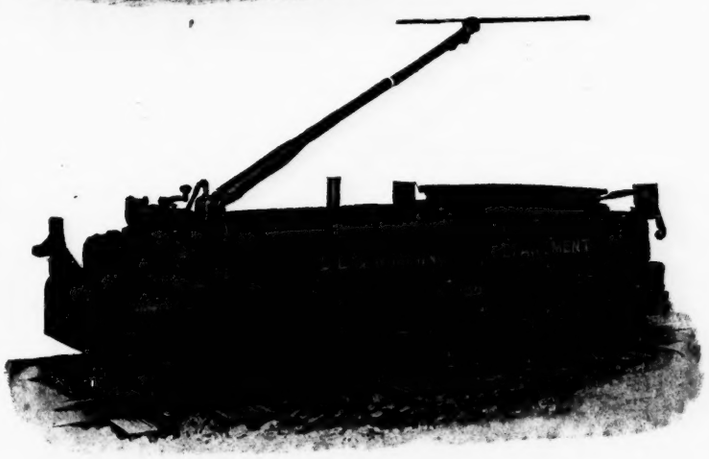

Above are Net Prices, F. O. B. Works, Columbus, O., with Freight Allowance east of the Mississippi River.

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We design and build complete Tipple and Coal Mine Equipments, including Tipples, Car Hauls, Dumps, Screens, Picking Tables and Loading Booms, Belt Conveyers, Crushers, Pulverizers, Coal Pockets, Coal Cutters, Locomotives, Drills, etc. Catalogs and Bulletins mailed free on request.

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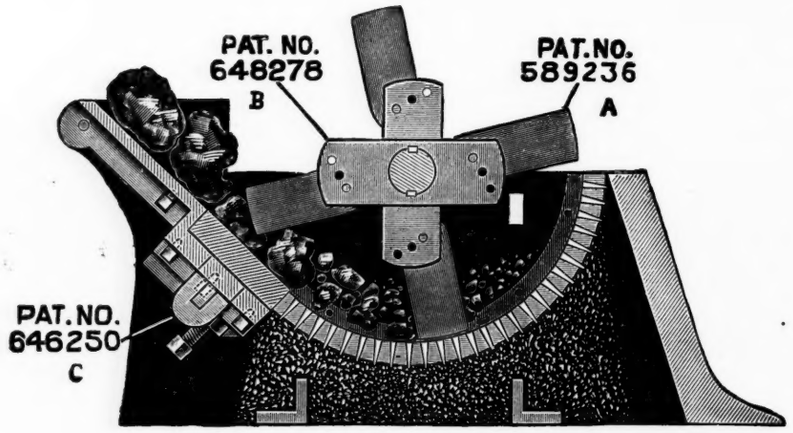
A Williams Crusher



His best friend because his most invaluable assistant in securing what every coke maker most wants—a better grade coke at less cost.

A Better Coke

Why is this so? Note that the hammers in the WILLIAMS are *alternating*. No hammer in any two successive rows of hammers follows *directly behind* any other hammer. They alternate in position; any piece of coal that one hammer misses, is directly in position to be crushed by the next alternating hammer.

That means a crushed product of *uniform* size, also one in which the better and poorer coal is thoroughly mixed, increasing the structure of the coke.

At Less Cost

Then note, too, that each hammer can be adjusted to 5 different positions in its disc. The result is that just as soon as wear takes place in the hammer, it can be readjusted to again crush the desired fineness.

It is never necessary to scrap slightly worn hammers to maintain a uniform fineness.

And the same is true of the adjustable "take-up-wear" breaker plate and cage. They can be adjusted to the desired position while the crusher is still in operation.

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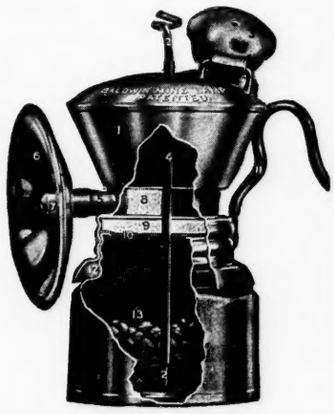
The Williams Patent Crusher and Pulverizer Company

Old Colony Building, Chicago

347 Monadnock Bldg., San Francisco, Cal. Factory: 2701 No. Broadway, St. Louis



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UNDERGROUND

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To-day more than half the mines in the United States are lighted with Baldwin Carbide Lamps. The Baldwin Lamp is used because it embraces a combination of features which makes it the only satisfactory carbide mine lamp.

It meets in compact form, every demand and requirement of the miner.

Its construction is simple and thoroughly practical.

It is reliable and durable.

It gives a continuous, uniform light.

It is the ONLY lamp that positively works AUTOMATICALLY.

It is absolutely safe and fool-proof.

Stress has been placed on the fact that a carbide lamp must work automatically—this is a feature which almost every miner requires in a carbide lamp, because it is the only means of insuring a continuous, uniform light and eliminates a strong objection of the miner—that of constantly adjusting a water valve regulator.

80% of the Carbide Mine Lamps in use are BALDWIN Lamps

This along with the fact that the Baldwin is the selection of men in charge of the largest mines in the country—men who are recognized as the master minds of the industry. Men who insist on knowing all there is to know of an article before it has their approval, should establish beyond all possible doubt the absolute superiority of this lamp.

Before deciding on a carbide lamp investigate the Baldwin. It has a longer record of experience behind it than any other carbide lamp and comprises the largest and most complete assortment—a lamp for almost every mining need.

Buy the original and only dependable carbide mine lamp that insures service, not an imitation—one that really gives the results you want. And the only lamp designed to meet mining conditions.

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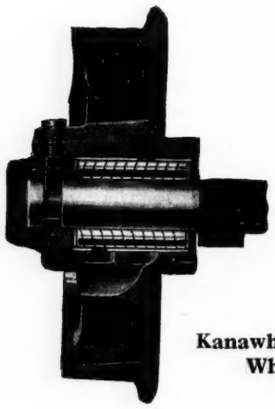
BRANCHES: 266 Market Street, San Francisco, California 56 St. Nicholas Street, Montreal, Canada



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NEWARK, NEW JERSEY

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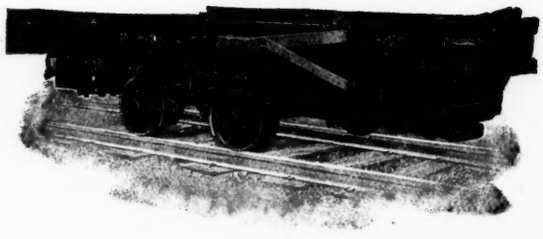

The big things about a car must be right but it is getting the multitude of little things right that makes a car successful. We watch these little things although there is more immediate profit in slighting them for we have been in business fifty years and want to be at least fifty more.

The Watt Mining Car Wheel Co.
Barnesville, Ohio
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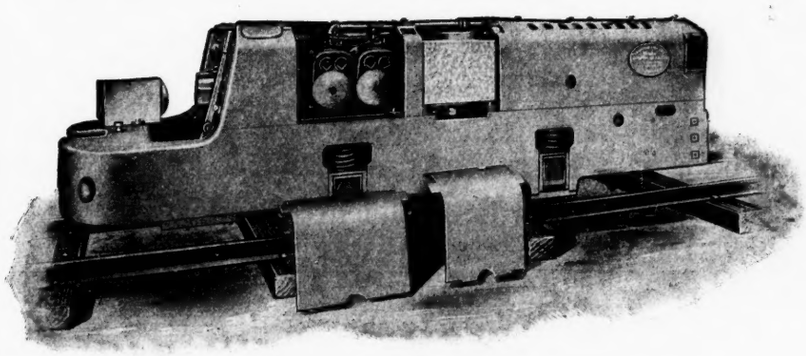
The Successful Gasoline Motor For Coal Mine Haulage



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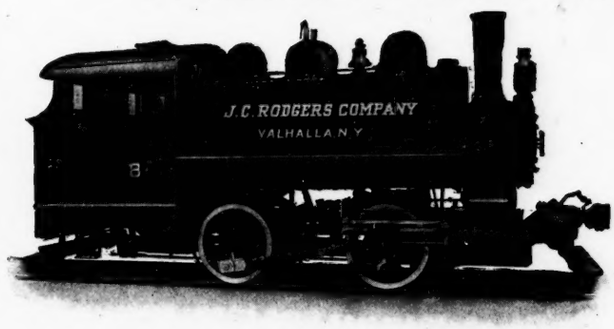

This company builds good locomotives or it could not have 50,000 of them to its credit.

In buying machinery or equipment, particularly locomotives, you necessarily have several qualifications in mind.

Adaptability to the service--plenty of power to start loads and boiler capacity to keep going.

Dependability, always ready for business.
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Convenience in handling.
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Correct materials for each and every part.
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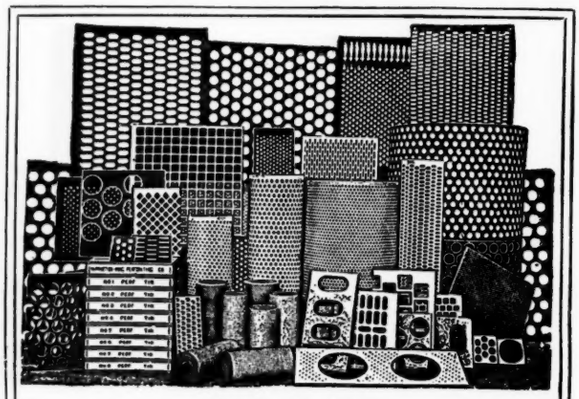

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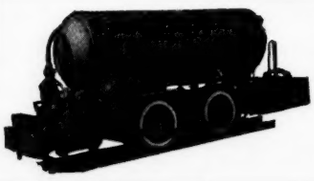

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Proof that they're the best mine locomotives built if you'll write for data.

H. K. Porter Co.
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AN IMPORTANT ANNOUNCEMENT

Every user of Pipe will be greatly interested in the information which will be published on pages (8, 9) January 11th in the COAL AGE.

This is a new feature in the pipe industry, and therefore should be carefully read by all who are either directly or indirectly interested in trade information.

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COAL AGE

Vol. 3 NEW YORK, JANUARY 4, 1913 No. 1

The End and the Means

IS anyone wise who hopes to attain the end without the means? Success in some degree is the chief object each of us is seeking. Education is the means whereby we may reach this goal of our ambition. We cannot be too well equipped for our life work, and by increased knowledge we not only earn more, but we can serve our family, our country and our generation with higher efficiency.

Education is of two kinds—one which we receive from others, and one which we give to ourselves. We refer here to the latter brand. Its office is to call forth power of every kind—power of thought, affection, will and outward action; power to observe, to reason, to judge, to contrive; power to adopt good ends firmly, and to pursue them efficiently; power to govern ourselves and to influence others; power to gain and to spread happiness.

And education should not cease when we leave school; or later, when we have succeeded in lifting our head a little above the crowd. It is no shame for a man to learn that which he does not know, whatever be his age. The two principal difficulties attending the education of people who are "on in years" is their proneness to believe the task hopeless, because of their handicap in age and their obstinate conceit.

Many people who were unknown at fifty have died famous. No one is ever beaten unless he is discouraged, and this latter feeling never helped any man over a difficulty, and never will. Despondency is a disease that saps manhood and produces complete paralysis of effort. Industry pays debts, while despair only increases them.

The conceit of age referred to above is really a species of false vanity, which is less ashamed of being ignorant than of being instructed. Pride is commendable when it dwells in a man's principles, but objectionable in his demeanor. Of course, we all agree that the man who undervalues himself will undervalue others, and he who undervalues others will oppress them.

Many old men are like old trees—past bearing themselves, they will suffer no young plants to flourish beneath them. However, this slight feeling of antipathy between youth and age is reciprocal. Young men think old men are fools, and old men know young men to be so. It is to be hoped that some day both classes will unite in the common belief that "ignorance is a voluntary misfortune, and that wisdom is to the mind what health is to the body."

An oak is not felled at one blow; Edison was not a master inventor the first day. No man was ever born wise, or was wise by chance. Wisdom is neither inheritance nor legacy. Other things may be seized on by might, or purchased with money, but knowledge is to be gained only by long continued study. Simple wishes never mined coal, and mere hoping never started a bank account. The man who cultivates hoping as an employment will find that "like our shadows our wishes lengthen as our sun declines."

When we call on our mind today for its highest efforts, and stretch it to the uttermost in our power, we have done ourselves a kindness. The mind will be all the better for it. Tomorrow we may do it again; each time it will answer more readily to our call. And it is not the quantity of study, or the amount of reading that makes us wise, but the advantage of the study to the purpose for which it is pursued. Mental, like physical faculties, are developed by exercise. It does not matter how bright a mind we have; if we do not use it, we will lose it.

Therefore, if the end of all human effort is honest success, and if this latter can only be realized through knowledge conquered by labor, then no man can afford to neglect training the mind to think and to discriminate between truth and error, which is the real object of education. The desire for knowledge, like the thirst for riches, increases ever with the acquisition of it. We should always remember that no talent comes unasked; no grace of mind stays unurged. There never was a man who reached a point where he could afford to abandon study and live altogether on his past reputation.

A Matter of Co-operation

In obedience to the whispers of the small voice within, we will state a few of our plans for this new year. Conscience forbids our working in the dark, so long as we profess to follow methods of co-operative procedure. Our aim and desire have been to judge matters from the point of view of all, and not of one. We have adhered to the belief that everything is right which tends to the happiness of mankind, and everything is wrong that increases the sum of human misery.

On the preceding page, we called attention to the necessity of gaining an education. Here we intend to outline briefly just how Coal Age can help in the accomplishment of that end. Everyone knows that even a skilled workman can't turn out a master job if his tools are lacking in completeness or quality. Preparation is half the battle. A great occasion is valuable to us, just in proportion as we have prepared ourselves to make use of it.

Last year the publishers of this paper expended more than a hundred thousand dollars getting together valuable data and printing Coal Age each week. The individual subscriber could not have purchased this same information for a penny less. Is it not the essence of wisdom, therefore, for each reader to take the fullest advantage of the opportunity offered? In other words, we are desirous of furnishing you with proper tools by way of a practical education. Resolve to spend two evenings, say six hours a week, carefully reading Coal Age, and at the end of one year you will know a lot more about actual mining than the young fellow who has just dropped in from a nearby college, with a sheepskin diploma locked up in his trunk.

We are not writing this with the idea of securing new subscribers; it is a plain talk directed solely at those readers whose $3 we have already banked. Of course, we might let it rest there, but we don't intend to. Education is one thing every man wants and is willing to pay for, but won't carry away with him. It's the same old story—with a staircase before us, we look for a rope to go down by.

Getting down to facts—The best way to determine what will be is to consider what has been. Last year we published 1776 pages of editorial matter. During the coming twelve months we will better this record both in quantity and quality. Not every page will interest each person, but if only one-half the articles appearing are read and digested, the result will be highly beneficial. Don't forget the old proverb—"A young man negligent, an old man necessitous."

The manufacture of coke will come in for greater attention this year than heretofore, and we will start a "Power Section" in our paper commencing Feb. 1. Our idea is to subdivide coal mining into its special phases, placing each department in the hands of an engineer, expert in the particular field he is to cover.

As a concrete example of what is to come, here are a few articles soon to appear: Electric Locomotive Practice; The Testing of Mine Air; Scientific Management; Early History of the Smoke Problem; Modern Strip-Pit Mining; Points from British Coal Mine Inspectors' Reports; Relation between Subsidence and Packing; Distribution of Producer Gas; Haulage Systems in European Collieries; *Series on* First Aid to the Injured; Occurrence of Coal in Alaska; *Series on* Economy in Colliery Power Plants; Compressed Air Troubles in British Mines; Strength and Size of Coal Pillars; Electric Mine-Signaling Systems; Shotfiring by Electricity; *Series on* The Preparation of Bituminous Coal; The Psychology of the Illegal Strike; Belgian Methods of Underground Development; The Engineering Aspects of Diamond-Drill Prospecting; The Use of a Refrigerating Plant for Cooling and Drying the Air in Deep Coal Mines; Modern Plans for Shaft Bottoms; Recent Developments in Byproduct Coke Ovens, and dozens of other articles now being prepared for us by coal men in all parts of the world.

In conclusion: We want you to co-operate with us, and get your money's worth. Don't be content simply to read what the other fellow says, write something yourself. There is no difference between buried treasure and concealed knowledge. We are judged, not by our intentions, but by the result of our actions.

Reducing Ventilation When Firing

By J. T. Beard

That there are always two sides to every debatable question goes without saying. The truth of this statement has been amply proved by the previous discussions in Coal Age, but by none more so than by the one just closed.

While there are doubtless still some ardent advocates of the doctrine that no mine ventilating fan should be built reversible; there are many other, equally practical, mining men who have been converted, by the last discussion, to the belief that no mine is fully equipped without this important feature.

All contend, rightly, that a reversible mine fan possesses possibilities that make for either *safety or destruction*, depending on the use to which it is put; and this, in turn, has been shown to depend on the intelligence, experience and accurate knowledge of conditions, on the part of the man in charge. But, while a few men see greater safety in excluding this feature of mine equipment from the list, because of its possible misuse; others claim that the fan should be built reversible so as to increase the chances for safety; and its use safeguarded by suitable restrictions and regulations.

We may ask: Is safety more assured by the absence of weapons of defense, on the ground that where there is no shotgun around there can be no accidental shooting? Is the theory correct that the nation's peace and safety are better assured and the chances of war minimized by the absence of the munitions of war? Most men, now, agree that it is the prevailing possibilities of action that speak for safety and success, in every sphere of life.

We are now facing another important subject for discussion. Although we do not realize it at present, there are perhaps fewer subjects fraught with greater possibilities of safety or danger, in coal mining, than the question: *Shall the normal circulation of air in the mine be reduced during the time of firing shots?*

This practise has been tried, in some mining districts, and the success claimed has won a few adherents; while on the other hand, by far the large majority of practical mining men have always considered it unsafe to reduce the air circulating in the mine, at the time of firing. In many districts, in the East and Middle West, it has been customary to speed up the fan, at such time.

The question is fairly a debatable one. Let it be understood from the start that this is not a question of high velocities, at the working face, which we all agree are both objectionable and dangerous. Neither is it a question of humidity or temperature of the mine air, except as these are incidental. It is not a question of whether the shots face the current or otherwise.

Let it be assumed that the mine, under normal conditions, is well ventilated by a current of pure air that sweeps the entire working face with a moderate velocity, sufficient for the removal of what gas, if any, is generated. Suppose, under these conditions, from 400 to 500 shots are to be fired; either by shotfirers, after the men have left the mine, or by a well-established system of rotation, in which the men fire their own shots in regular order, beginning on the last of the air, at a fixed time, and proceeding regularly against the air.

Now, ask the question: Will there be less danger of a gas or dust explosion occurring and developing into a mine explosion when the air has been short-circuited at some point, so as to reduce the circulation in the workings to a low ebb or cut it off completely? This is the question for debate.

It is the aim of Coal Age to confine the discussion of each subject, as far as practicable, to one month; except where the interest is such as to call for an extension of the time. Let every practical mining man help to decide this question, by giving his experience and conclusions.

SNAP SHOTS IN COAL MINING

Views at Anthracite Mines in Northern Pennsylvania Field

Fig. 1—Electric motor hauling trip to slope in hard-coal mine near Scranton. Shows the hard sandstone roof so common in the anthracite region.

Fig. 2—Miner and laborer working in mine at Pittston. The miner is drilling a hole preparatory to shooting.

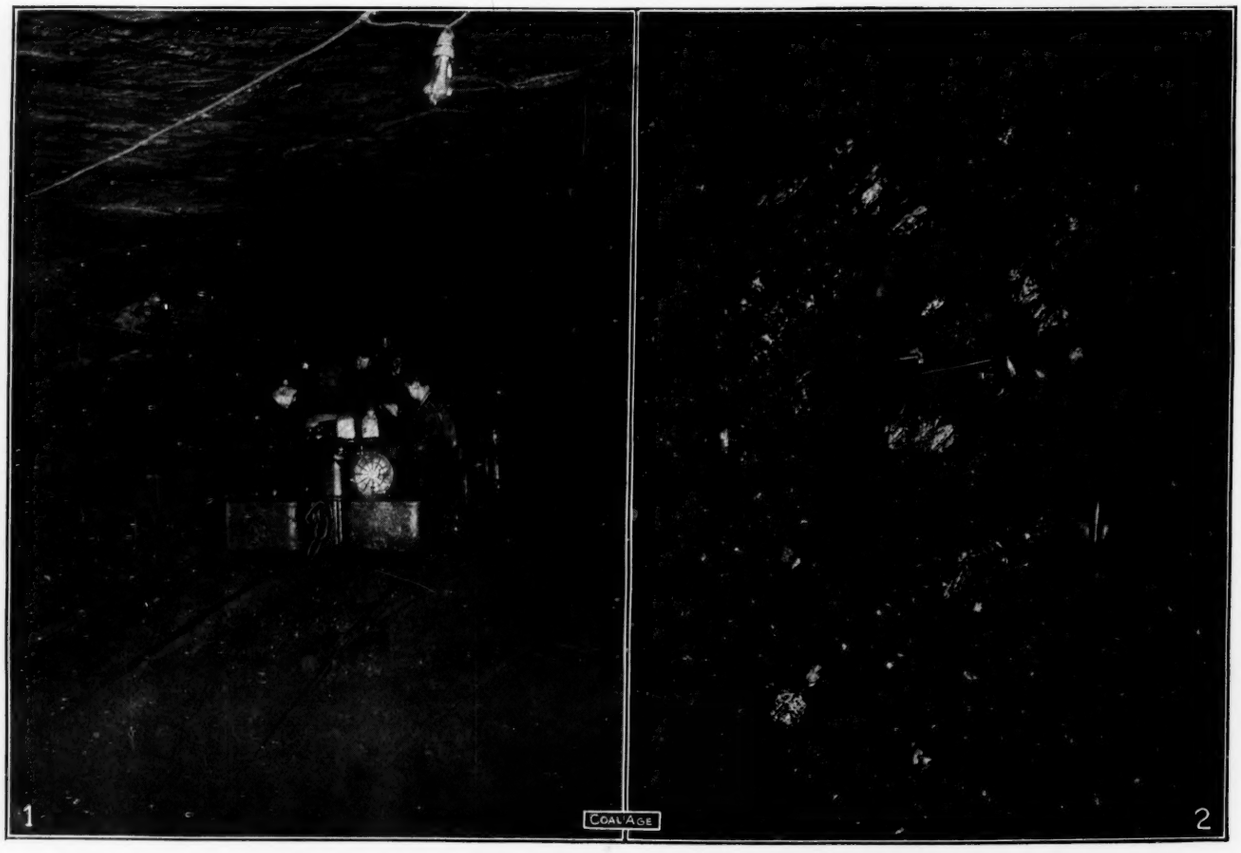
Fig. 3—Pushing cars onto cage previous to hoisting, in Erie Mine No. 6, at Dunmore. The entire bodies of the cars in the anthracite region are built to overhang the track, giving them a large capacity.

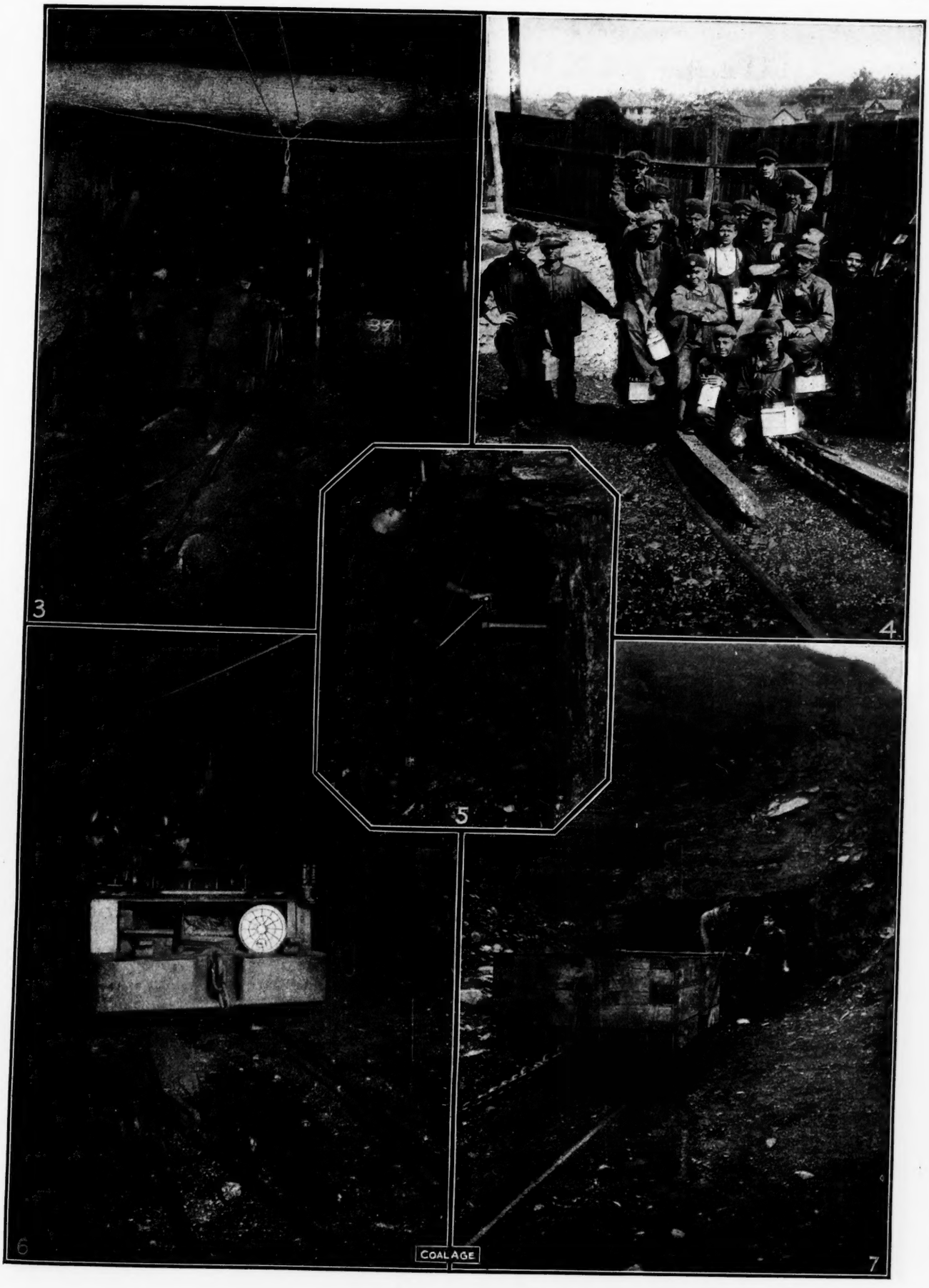
Fig. 4—Miners and breaker-boys ready to go home after a hard day's work in mine near Scranton. They hardly exhibit the "distressing effects of child labor," of which we have often read.

Fig. 5—Miner drilling hole at face in an anthracite mine. Practically all the coal is shot from the solid, without preliminary under-mining.

Fig. 6—Electric motor pulling trip of loads to shaft in mine at Dunmore. Exhibits method of suspending trolley wire from roof by long rod, thus avoiding use of a cross timber.

Fig. 7—Empties ready to go down slope in mine at Pittston. The drift mouths of the anthracite mines are rarely of an imposing character.

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COAL AGE

IDEAS AND SUGGESTIONS

When Times Are Good and Men Are Scarce

By A. W. Hesse*

When times are good, cars are scarce and so are men. When the trade is poor, men and cars are plentiful, but the mine work drags along like "a ship without a sail." For this reason, the superintendent and mine foreman are between the "devil and the deep sea," most of the time.

It was hunger that drove the Germans across the Rhine. The high cost of living and the desire to live near a city is causing a good many shifts in the mining population. Behind every such change we find an economic fact.

During these times of heavy tonnage demands, the order to rush everything is passed. Places are provided in the mine, on headings that ordinarily would not be worked until the pillars could be extracted at once. The "green" man, on the other hand, must have a solid place. Suppose you get a gang of men and place them on these headings. They labor two or three days shooting or digging the places to "death," and then the car shortage strikes you. A day or two of "no cars" and the men disappear like scared rabbits.

Either the use of that persuasive coin in some other fellow's hand, or the sight of some other mine's car allotment is sufficient to take your men away in droves; and it is done very frequently in these days.

If there is any time at which a mine superintendent longs for winter, it must be when men are scarce—in the hope that cold weather will drive in the miners for at least a few months.

To escape that scathing criticism, so freely given by conservationists, care must be taken not to overdevelop the mine. Most of us know that once a mine is established, the recovery of heading, room and pillars should be properly proportioned in order to avoid that loss of coal so frequently due to falls in standing rooms.

Quite frequently a mine is overdeveloped because of the inability of the men working therein to turn the trick of robbing. This is getting to be a very important factor. Pick miners are becoming scarce and, unless pillars can be cut by machine, the return on this work is very slow.

A remedy often resorted to when men are scarce is known as concentration. The labor must be thoroughly systematized in order to give a high production.

A driver will handle coal from eight men on a single heading much easier than he will from three men on one heading, two men on another and three men somewhere else. Likewise, a motor will make quicker trips when hauling from a concentrated operation than when running all over the mine.

There are any number of mines right now struggling along with fewer miners, notwithstanding the demand for coal, and it is safe to say that these mines will show a higher ultimate percentage of recovery than those mines in which systematic work is thrown to the winds and the mine filled with men.

It is now a question whether it is more profitable to take advantage of the present demand and run the risk of losing a quantity of coal in pillars, or to keep the work properly lined up in the hope that with a high percentage of recovery and a consistent market the returns will far offset those of the former method.

*Assistant chief engineer, Consolidation Coal Co., Fairmont, W. Va.

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Inadequacy of Many Return Airways

By Francis Glover*

In these days of modern progress, when most problems seem so thoroughly understood, it is really appalling that mine explosions should come around as regularly as the "Hardy Annual." For 20 years or more, after every explosion, an inquiry has been made as to its cause, and the usual result has been to place the blame on an ignition of gas caused by a defective lamp, a blown-out shot or the negligence of someone.

Rarely has any further inquiry been made. In looking for ultimate causes, it is remarkable that the condition of the return entry has not been duly considered. For at many mines today which have a fine equipment on the surface and adequate haulage airways, you will find the other ventilating passages incapable of performing the work demanded of them without excessive resistance.

In some cases they were not large enough to carry the air when first driven, but frequently they are large enough but too crooked, and the air is much impeded in its progress. It has not appeared necessary to drive them straight because, as soon as a section is completed, the rails will be removed.

This fact not only explains why we permit the heading to be crooked, but also why it is allowed to become full of fallen rock. Once the road is torn up, it becomes impossible to clear up the heading without excessive expense. It therefore fast becomes full of a mass of broken slabs of roof, through which the air cannot find its way at any speed.

In some mines where such caves have occurred, it has been customary to break up the rock into smaller sizes, with dynamite, so that it will lie smoothly on the floor and give the air an opportunity to travel without obstruction over it. But in many mines even this is not done, and the airways not being used for haulage, traveling or piping, and so not used or open for inspection fill with rock, yet, because the airways are not explored, the reason why the air is hard to move is not easily apparent.

A larger water gage is used and much of the air is lost which would otherwise go to the face. The practice of leveling the rock by dynamite, to which I have referred, is dangerous and not to be encouraged, because

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a body of gas in a gaseous mine might come along the heading at any time and be ignited by the open shots.

At a colliery in England, of which I was the assistant general manager for a long time, the output for the last 30 years has been from 2000 to 3000 tons per 8-hr. day. The depth of the lowest bed at the shaft is about 2250 ft., and as the present workings are about 3000 ft. from the shaft bottom and the seam is dipping 1 ft. in 7, the depth from the surface is about 2680 feet.

The bottom seam is very gassy and at different times had been ignited at most of the adjoining collieries, but at this particular mine during the whole period of 30 years, not the slightest mishap has occurred. Mueseler lamps were used, and this light, while not perhaps one of the best from an illuminating standpoint, is more than ordinarily safe, because it goes out when held a little out of the perpendicular. Thus, lamp glasses are not often cracked.

No shotfiring was allowed while the men were in the mines, and the rules and regulations were strictly enforced. All coal dust was removed from the main roads and the auxiliary gangways.

But I do not attribute the safety of that mine to any of the above conditions and safety regulatations. I have no doubt that occasionally a defective lamp *had* been used during that 30 years, and that some shots *had* blown out. Its safeness from gas explosions was due to the efficient and systematic way in which the mine was laid out and had been worked from its commencement, to its splendid airways, so designed and maintained that any gas which was liberated speedily found its way to the surface, accompanied by sufficient air to dilute it.

During my employment at this mine, one of the overmen and myself were sent to a near-by colliery, which had been working about six years, and where they had all the latest "tackle." We went to inspect a fine endless-rope haulage, which had recently been installed. On the surface, the colliery was well laid out, and there was a fine ventilating fan.

But when we got down to the bottom of the main-haulage incline, we noticed traces of gas. In the workings, we found quite a body of it and, suspecting the cause, we inspected the return airway and found it not at all what it should be. Some three or four years later this mine exploded and killed between 200 and 300 men, and everyone seemed to wonder how it happened, for the mines in that district are not subject to spontaneous combustion.

It takes two things to cause an explosion, the fire and the fuel. If you remove the fuel, the explosion cannot take place, even if the fire is applied.

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Producer Gas from Low Grade Coal

It may be of interest to American firms making use of producer gas for different purposes to know that within the last two years several French inventors have taken out patents for, and are now putting into actual operation, a system of forced-draft furnaces, burning even the poorest grades of coal and coke. These furnaces are employed in the production, by a method also patented, of producer gas from low-quality coal containing up to 65 per cent. of cinders.

With one exception, however, all of these inventors have confined their experiments and operations to small "gazogènes," as these furnaces are called, producing sufficient gas to drive only low-power engines, etc. The one exception to this is a company (whose name may be had from the Bureau of Foreign and Domestic Commerce, Washington, D. C.), capitalized at $240,000, which manufactures apparatus sufficiently large and powerful to produce gas for machinery of nearly 1000 hp. per "gazogène." As a matter of fact, the inventor informs the consulate that there is no limit to the power of the machine, it being merely a matter of construction.

These "gazogènes," or producers, in addition to the generation of gas, are so constructed as to recover the ammonia and coal tar and other byproducts of coal. This is done, however, only in the larger sizes. The coal or coke used for the production of gas in these machines is not broken up or crushed in any way.

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A Unique Haulage System

In these days of high-efficiency electric locomotives, which haul trips of 40 to 50 loaded mine cars at a relatively rapid speed, it seems strange that a coal mine depending entirely upon dogs for haulage trips can operate profitably, yet such is the case.

For the past 27 years, W. A. Werner has depended solely upon dogs of various breeds, from rat terriers to Newfoundlands, for haulage power in his mines, at Zanesville, Ohio. The average output of this mine is 2000 bu. (80 tons) per day, which is loaded on wagons and delivered to Zanesville. The entire output is consumed locally.

DOGS HAULING COAL FROM A ZANESVILLE, OHIO, MINE

The vein is about 3 ft. in height and no roof is taken down. Some of the entries are driven to a distance of 2500 ft., and the rooms are from 300 to 400 ft. deep. Each miner mines his own coal, loads it into cars, which hold about 1800 lb. run-of-mine, and assists the dogs in hauling it to bins on the outside. The car wheels are without flanges and run upon wooden tracks. From one to three dogs haul each car, assisted by the miner, who rides on a "lazy-board," which projects behind the car. Sitting on this "lazy-board" the miner helps the dogs by pushing with his back against the car and his feet on the mine floor.

Upon reaching the bins outside, the miner tips his coal and then rides back into the mine, the dogs taking him back to the face of his coal.

The miners prefer dog haulage, as in this way they do not require anyone to assist them and can do their own loading, hauling and tipping of coal.

A Model Plant in the Coke Region

By Sim Reynolds*

SYNOPSIS—Some notes on one of the important Connellsville coke plants. It is estimated that the life of this operation will exceed that of the district as a whole. Mining is conducted along broad and comprehensive lines and unusual attention is devoted to welfare work.

East of the Monongahela River, in that part of Pennsylvania known as the Coke Region, a great deal has been done in late years to bring coal mining, coke washing, and the living conditions of the employees of these industries up to the perfection they now present. In some cases this has been a settled and persistent policy on the part of the companies, rather than any sudden outburst of zeal in coke manufacture and mining ethics, and the subject of this sketch, the Oliver-Snyder Co., is an example of this kind.

This company has been in the coke-making business for about 20 years, and it is stated on the authority of one of its chief officials that at the time recently set by an eminent mining engineer for the exhaustion of the coal in the Connellsville Region, this concern fully expects to still be engaged in the business of mining coal and making coke, so extensive are their properties. The company operates three plants known as the "Oliver No. 1," "Oliver No. 2," and "Oliver No. 3." In all they employ about 1500 men and operate 1100 coke ovens. The coal acreage consisted originally of 3300 acres, and of this perhaps only about 50 per cent. has been exhausted up to the present time.

The company's present workings are reached by three main hoisting shafts about 400 ft. in depth. Near the middle of their property there is a central pumping station which takes care of all the water made by all three mines. The power plants are practically identical, of approximately 1000-hp. capacity and equipped with Parsons' Coke-Breeze Burning System of heat-generation under the boilers. Transmission of coal to the shafts underground is by rope on the main entries, the loaded cars being gathered by horses. Ventilation of the mines is obtained by steam-driven fans of the Capell type, sizes 10x18 ft., producing now 150,000 ft. each with a 2-in. water gage. Shipments are made from all three mines over the B. & O. and the Pensylvania Lines, both systems running through the properties. The company operates 400 private cars.

Two Views of the Surface Plant at the Oliver No. 2 Mine

Welfare Work of the Company.

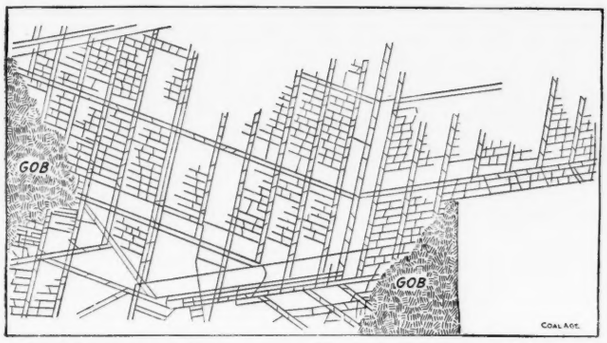
As an example of the interest the Oliver-Snyder Co.

Typical Miners' Houses at the Oliver No. 2 Mine, Oliver, Penn.

*Mt. Braddock, Penn.

shows in the welfare of its employees it may be noted that 44 miners' houses are being moved from their present site to a position where they will be totally free from the coke-smoke environment. The miners' houses owned by this company present an unusually attractive appearance, being painted a slate color and trimmed with white, with neat fences and outbuildings and ample room for gardening and grass plots. Obviously much care and thought have been given to the living conditions at these three plants, as is readily seen by the well graded streets, lined with rows of large shade trees planted years ago. This is something which costs the company owning the new mining town, practically nothing except a little trouble and thought and yet which in years to come will pay great dividends in accrued benefits to the health and happiness of the employees. Also these miners' homes are supplied with running water and electric light. One of the dwellings has been fitted up as a Y. M. C. A. building, where sociological work and a mining class is kept up under the direction of Robert Ainsley, one of the foremen of No. 2 mine.

The first aid work of the three plants, which consists of five trained crews, is managed by Clyde Brehm, Chief Electrician for the company. The managing head of



MAP SHOWING SYSTEM OF WORKING IN THE COKING REGION

the Oliver-Snyder Co., Mr. Fred C. Keighley, is vitally interested in all that concerns the welfare of the company's employees as well as the product of the mines, taking an active interest in the living conditions and the home life of his men, not a few of whom have been with the company as long as Mr. Keighley himself, and that is nearing the quarter century mark. This fact alone speaks well for the relations between this company and its workers.

In a celebration at Uniontown recently, termed "Old Home Week," a profile map of Oliver No. 2 Mine on exhibition there created quite a great deal of interest. This was not due alone to the excellent method of work shown, but because of the unique construction of the map. The plan of the workings had been etched out on black leather, and later traced in with white enamel. The idea originated with the General Superintendent Keighley, and the map was made under his direction. It has since been presented to the Mining Department of the School of Mines, State College, Pennsylvania.

First aid hospitals in the interior of the mines of this company are an interesting feature of their work. They are installed near the foot of each shaft, and are replete with rescue and first aid apparatus, are well lighted by electricity, have hot and cold running water, etc. Injured workmen can there receive attention before being conveyed to the surface.

Anthracite a Luxury

Anthracite coal was at one time an important factor in blast-furnace practice, but its use in that line of industry has now almost entirely ceased, according to E. W. Parker, of the United States Geological Survey, as it has been supplanted by coke made from bituminous coal. The principal demand for anthracite will be in the future, as it has been in the more recent past, restricted largely to domestic trade, for which such sizes as furnace, egg, stove, and chestnut are required. The breaking down of the lump coal, which was formerly a marketable product, for the preparation of the domestic sizes results in a much larger proportion of the small or undesirable sizes, all of which are sold at less than the cost of production. All the profits on the mining operations must be obtained from the prepared domestic sizes, for the revenue obtained from the smaller sizes, which are sold largely in competition with bituminous coal for steaming purposes, serves only to reduce the cost of the domestic sizes. The conditions under which the anthracite mines are operated, the greater depths to which the workings are carried, the consequent increased expense of mining, and the increasing cost of labor all contribute to make anthracite fuel more and more a luxury.

During recent years the anthracite operators have adopted the policy of making an allowance of 50 cents per ton from circular prices for domestic coal purchased in April of each year, with an advance of 10 cents per ton for each succeeding month until the schedule prices are restored in September. This has had a more salutary effect in steadying the anthracite trade than any other action taken by those controlling the anthracite industry. Its purpose is to encourage the purchase of coal in the spring and early summer, making the cellars of the consumers the storage places for the following winter, and at the same time to cause the mines to be operated more regularly, thus giving steadier employment to miners throughout the year.

Price of Government Maps Increased

After Jan. 1 the standard topographic maps of the United States Geological Survey will be sold at 10 cents a copy or 6 cents wholesale, an order amounting to $3 or more entitling the purchaser to the reduced rate. These maps have heretofore been sold by the Director of the Geological Survey, under authority of Congress, at 5 cents retail and 3 cents wholesale, but for some time it has been recognized that this price has been too low considering the cost of their preparation.

The Director of the Survey at Washington will be glad to furnish an index map, covering any area desired, which shows the particular quadrangles, as they are called, which have been surveyed and the corresponding maps issued for sale. This index-map circular also contains a list of special maps of the United States, of states, and of national parks, mining camps, etc., with the prices, and a list of available geologic reports on any part of the area shown.

Strip Pit Mining with Steam Shovels

By C. M. Young*

SYNOPSIS—The recovery of coal adjacent to the outcrop is often difficult to effect in the mine, due to the disintegration of the roof, and in such areas stripping must be resorted to. Modern development in methods of stripping has also brought with it some remarkably low costs. This article describes an operation in Kansas where the largest shovel in the world is in use.

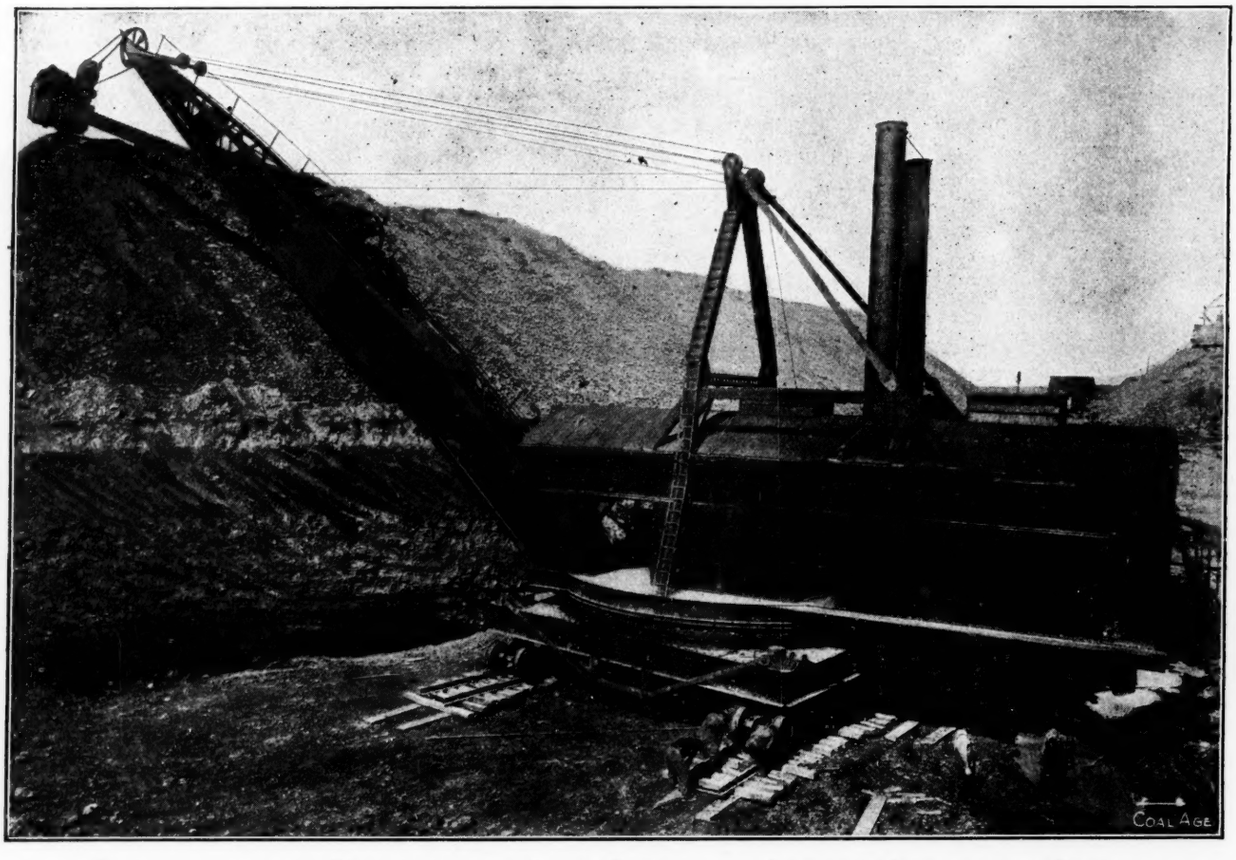
The coal fields of southeast Kansas now present a spectacular illustration of the application of machinery to mining. This is strip-pit work, in which the overburden is removed by the largest steam shovels yet constructed.

In this part of the state the coal outcrops and the strata dip gently to the west and north. Most of the coal is extracted from shaft mines, worked by the room-and-pillar method, but near the outcrop the roof is too poor to permit underground work without prohibitive expense for timbering. The coal has been worked back from the outcrop by stripping for many years, but only ordinary slip scrapers were employed until recently.

There is a considerable area of coal land, lying between the shaft mines on one side and the limits of profitable scraper stripping on the other, which can be worked by steam shovels. Within these limits the overburden will vary in thickness from about 10 ft. to 30 or 35 ft. Considerable coal has been stripped by scrapers to greater depths than 10 ft., but large quantities remain with less cover than this which will be stripped by shovels. There is coal of greater depth than 35 ft. which cannot well be handled under cover, but this is probably the limit of profitable stripping under present conditions, though an advance in the price of coal may make it profitable to strip to greater depths.

The Marion Shovel

There are now working in the district about twenty shovels, having an average dipper capacity of about 3½ cu.yd. The most spectacular work is being done on the land of the Central Coal & Coke Co., where there are two firms operating near together under contract. One of these is now erecting the third of three Bucyrus shovels, and the other has just completed the second of two Marion shovels.



Photograph of the World's Largest Steam Shovel on a Stripping Operation in Kansas

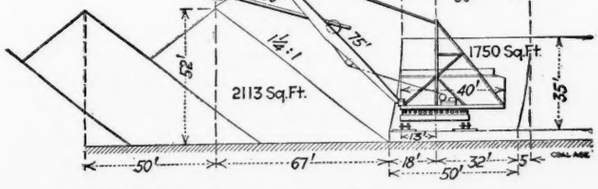
These shovels are impressive in size and capacity. The Marion machine has dimensions as follows:

Dipper capacity	5 yd
Boom	90 ft.
Dipper handle	54 ft.
Height of dump above rail (boom 45°)	65 ft.
Radius of cut at 40 ft. elevation	103 ft.
Radius of cut at bottom of pit	61 ft.
Reach from pivotal center to center of dump	95 ft.
Size of hoisting engine (double)	14x16 in.
Size of rotating engine (double)	10x11 in.
Size of crowding engine (double)	9½x9 in.
Size of hoisting cable	1¼ in.
Size of boom hoist cable	1 in.
Approximate working weight	525,000 lbs.
Ballast	30,000 to 40,000 lbs

* Associate Professor of Mining Engineering, University of Kansas.

This machine was shipped in nine cars and about three weeks' time was required for erection. It is carried on four 4-wheel trucks. In this type of shovel the boom does not turn, but the upper frame carrying the machinery rests on forty-five 12-in. rollers. The Bucyrus shovels are mounted in a similar manner and this fact makes it unnecessary to turn the shovel at the end of the cut. Instead of this the whole upper part is swung around on the lower frame and digs backward on a line parallel to the first cut. The foot of the boom is vertically above one side of the roller track, so that the weight is transmitted directly to the lower frame.

To make it possible to move the machines over uneven tracks, they are provided with track equalizing devices. These are hydraulic cylinders placed at one end of the frame, and transmitting the weight from the lower frame to the trucks. They are provided with a pump and with a bypass, so that the fluid may flow from one cylinder to another or to the pump reservoir. This device permits the moving of the machine on tracks laid on the surface of the uncovered coal with almost no ballasting and without torsional strain on the frame.



WORKING RANGE OF A 3½-YD. SHOVEL

One Marion machine has excavated a pit 92 ft. wide and 24 ft. deep, piling the excavated earth on the top of the bank at one side. This gives an idea of the magnitude of the machine.

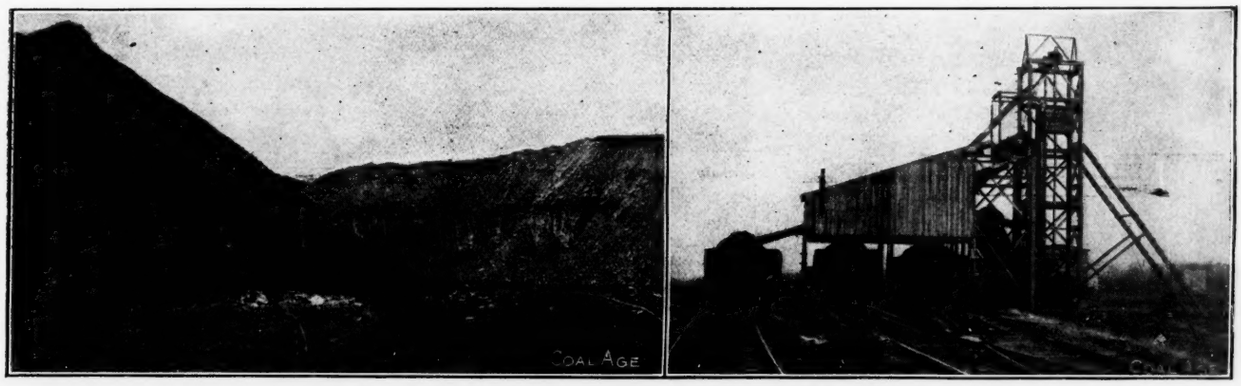
THE BUCYRUS SHOVEL

The Bucyrus shovels are similar in general design to the Marion, but the company using them has not employed any of the extreme size mentioned above, though the manufacturers are prepared to build them. The largest now used in this field have 3½-yd. buckets, 75-ft. booms, and weigh about 175 tons in working condition. Assuming coal 3 to 4 ft. thick, these shovels will remove 15 to 20 ft. of overburden from 80 ft. of coal, or 34 to 35 ft. of overburden from 50 ft. of coal, dumping 85 ft. from the center of the turntable. The position of the shovel and the cross-sectional area of the overburden and spoil bank when stripping 35 ft. of overburden are shown in the line drawing supplied by the Bucyrus company. They will dig their way to the coal on an 8 per cent. grade. Some machines are provided with electric generators and lights for night work.

It is stated that the cost of handling the ordinary overburden of the district will be from three to four cents per cubic yard. Probably these figures are slightly low, as the wage scale has been raised since they were given. The present scale is: Shovel runner, $150 per month; craneman, $110 per month; fireman, $75 per month.

The 3½-yd. shovel, removing 20 ft. of overburden, will uncover about 6000 tons per month of coal 3 ft. thick at an expense of about $1075. This does not include the handling of the coal.

The uncovered coal is easily handled. Vertical holes are drilled with augers and squibbed with 2 to 3 in. of dynamite to remove moisture. The dynamite, with lighted fuse, is dropped into the hole and the blowing out of the fuse removes danger of premature ignition of the black powder, which is immediately poured in. This is fired by a short length of fuse, which is dropped down a pipe, acting like a fuse. The coal is then loaded by hand and hauled to the tipple. The simple type of tipple used is shown in the accompanying photos. It is in fact little more than a frame for the screens.



SCENE IN A STRIP PIT ABOUT 90 FT. WIDE, AND TYPE OF TIPPLE USED FOR SCREENING THE COAL

One company expects to haul cars to the tipple with an endless rope. Another will lay track into the pit on a 3 per cent. grade and haul with locomotives. The tipple is located opposite the middle of the pit on the side toward which the stripping is progressing. There are several thousand acres of coal suitable for stripping and the operation as now carried on should add considerably to the output of the district.

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When using rescue apparatus which contains caustic soda, remove the soda from the bag as soon as the apparatus is taken off or it will cake and have to be dissolved with warm water and a fresh supply procured. If removed at once it may be washed, dried or melted, recast and used again. India rubber regenerating and breathing bags should be washed out with warm water and thoroughly dried before the apparatus is recharged unless it is needed immediately, in which case washing is not necessary. Masks and rubber mouthpieces should be washed with soap and water, not only for cleanliness, but to preserve the rubber.

The Reforestation of Mining Areas

SPECIAL CORRESPONDENCE

SYNOPSIS—In the Midlands of England, the tree found desirable for reforestation of ground which is covered with mine refuse is the black alder, which also is highly resistant to smoky atmospheres. Instead of popular interest in tree planting being confined to the setting of individual trees on land around schoolhouses or bordering on roads, it should be extended to the growth of forests planted largely for the purposes of social betterment.

The problem resulting from the general destruction of forests assumes a serious aspect in the more important mining and metal-working centers of the world. A large extension of the movement for reforestation has taken place in the Midlands of Great Britain.

The areas adjacent to Birmingham and surrounding industrial cities are not called without reason the "Black Country," and there is no doubt that until quite recently the predominant features of the scenery were furnace slag, mine heaps and dreary looking waste lands interspersed with seething industrial activities.

MINE WASTE IS SUITABLE SOIL FOR TREES

To correct this, an association was formed in 1903 as a result of a public meeting held in Birmingham, to promote the reforestation of waste ground in the Midlands and particularly in the parts of Staffordshire and Worcestershire known as the "Black Country."

Once this area was forest, but at the time of the founding of the association, a large area lay wholly waste, no attempt being made to conceal the shaft dumps and spoil banks. This area, at the least computation, contained considerably more than 14,000 acres and was wholly occupied by heaps of rubbish.

In order to restore this land to its former beauty, forests were planted and developed according to the principles in practice in France, Belgium, Germany and Austria. It was found to be possible to grow thriving trees in such unpromising situations as the soil formed of mine waste, furnace slag and even the ash of burned shale.

The deterrent effect of a smoky atmosphere on the growth of trees was argued, but it was found that smoke was not so harmful as sulphur, which was emitted solely by certain industries only found in a few localities. Moreover, the increasing use of power or producer gas and the utilization of waste products of combustion in the industries of the area present a factor of hope which should become more and more predominant as economy is practiced in industrial operations.

FIGS. 1 AND 2. FEVER HOSPITAL MOUND, BILSTON, SOUTH STAFFORDSHIRE. PLANTED 1907-1908. THE ALDERS ARE ABOUT 10 FT. HIGH. PHOTOGRAPHED IN SEPT., 1912. SYCAMORES IN FOREGROUND ARE SPINDLING, OWING TO THE SEASONS NOT HAVING FAVORED THEIR GROWTH

MANNER OF PLANTING TREES

No manure or imported soil was found necessary to make the trees take root, and the only preparation made was to dig pits about 1 ft. cube, the top soil being placed at the bottom. Trees two to four years old were then planted 4 ft. apart in such pits, or 2722 trees per acre. In the older plantations the trees were spaced 5 ft. apart, or 1742 per acre, but these did not do so well as with the closer spacing.

It was found that almost all the work of planting could be done satisfactorily by unskilled labor. It was early realized that plantations, even of infant trees, were better neighbors than unsightly waste heaps, and the presence of each plantation added enormously to the value of building land in its vicinity.

The first two plantations were finished before Christmas Eve in 1904, and arrangements were pushed forward to increase the work of the association, which, it should be remarked, was supported by voluntary contributions.

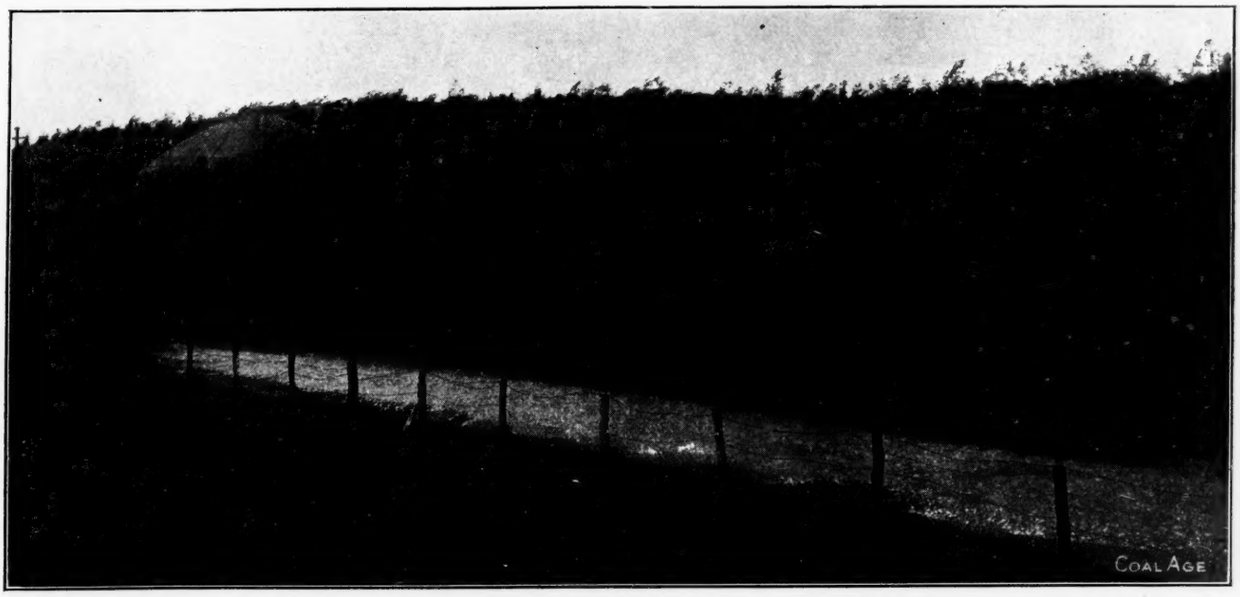

FIG. 3. FEVER HOSPITAL MOUND. WILLOWS IN FOREGROUND, ALDER AND WYCH ELM HIGHER UP. THE PIECE OF SHALE GROUND IN THE REAR HAS SMALL ALDERS ON IT, WHICH ARE STUNTED OWING TO THE SEVERITY OF THE WIND. PHOTOGRAPHD, SEPT. 12, 1912

At the present day, there are 21 plantations with a total area of 73 acres holding about 150,000 trees.

Various methods of forestry have been attempted and experiments have been made with various species in order to determine the most suitable methods and trees for the area under consideration.

THE BLACK ALDER

Of all the trees which have been tried, the black alder has done the best. Fig. 1 shows a typical tree planted in the winter of 1907. It is now 10 ft. high. The sticks in the foreground are sycamore, planted at the same time. The white alder, as used for mine banks on the Continent, does not as yet complete on equal terms with the native tree.

It may be pointed out that the alder has three distinct advantages in this connection. In the first place it grows fast and has a high resistance to the effects of smoke. In the second place it fertilizes the soil, the action being due probably to fungoid colonies at its roots. As a third advantage, its wood is readily salable at an early age.

It will be seen that the Midland Association has had a somewhat different experience from some other forestry organizations, where it has been found that conifers, notably, Corsican pine and Sitka spruce have been the most advantageous trees to plant in reforestation schemes. Possibly the preference of other foresters has been due to the fact that conifers grow faster than oak, ash, beech or elm, and in the forester's mind, conifers always have the first place.

Birch, alder and poplars are much needed in the lumber market and are quick growers. Corsican pine and Sitka spruce are not much used in Great Britain,

FIG. 4. AS SEEN IN JANUARY, 1912

FIG. 5. AS SEEN IN APRIL, 1912

BLACK WAGON MOUND, OLD HILL, SOUTH STAFFORDSHIRE, ENGLAND. ALDERS ON NORTH SIDE IN BARE SHALE, 2½ YEARS AFTER PLANTING

although there is no reason for their being neglected. The trees actually preferred are Scotch pine instead of Corsican, and Norway spruce instead of the Sitka variety. It is proposed in the plantations under the care of the Midland Reafforesting Association to try the Corsican and Sitka varieties when they obtain an opportunity of doing so in more or less smokeless districts.

These trees, however, do not flourish very well where there is much smoke and the alder, therefore, appears to be preëminently the tree which is adaptable for planting on mine-waste heaps and in similar localities in the vicinity of large works, where there is a smoky atmosphere.

Where Timber Has a Large Money Value

Fig. 2 shows alders four years old planted 5 ft. apart. It has been found that the poplar grows freely. Under normal conditions timber is a crop which, although yielding a good profit in the course of the years, has a slow turn-over and consequently locks up much capital. With the woods of quick growth, however, and especially with a local demand, one of the great difficulties in the way of reforestation is removed.

It is reasonable to surmise that it may be possible to develop sufficient planting to enable a colliery to obtain its own supply of mine props. Alder and birch have a ready sale as young trees. In Great Britain, larch and similar wood for mine props, after about 25 years of growth, are worth $3.69 per short ton; alder for turning, of 18 to 20 years' growth, costs $6.51 per short ton.

Fig. 3 shows a general view of plantation No. 14 of the association; this was planted four years ago. In the foreground are willows, and behind are alders and wych elms. The alders on the patch of shale seen in the illustration are too small to be discernible, the slow growth being largely due to wind which strikes that point.

Reforestation as a Feature of Village Betterment

Recently the association has reached a stage where it has been publicly recognized by a municipal corporation as the proper authority to deal with waste lands and the action of the corporation has been approved by the Local Government Board. After considerable negotiation, the Town Council of West Bromwich leased, at a nominal rent, 10 acres of mine-waste heaps to the association for 21 years, with power of renewal.

On Jan. 12, 1912, an Arbor Day was held at which the mayor and many members of the Town Council, members of the association and teachers and children from the elementary schools in the town, assembled on the waste heaps and planted trees. Ultimately the area will accommodate 13,000 plants. So great was the success of this function that since that day six Arbor celebrations have been held, and another has been arranged for the coming season.

In addition to this, there have been ceremonial plantings in which children took no part because the distance was too far away from any schools. Fig. 4 shows a view of the "Black Wagon" mound at Old Hill, Staffordshire, taken in mid-winter. The view is well chosen, as by the exercise of a little imagination an idea can be gained of the desolate appearance, these pit mounds presented in the days before anything was attempted to make them attractive, while on the other hand the transformation effected when the trees are in leaf over this area can be readily imagined.

Fig. 6. Photographed in January, 1912 Black Wagon Mound. Fire under Foreground in Left Picture.

Fig. 7. Photographed in April, 1912 Mostly Alders Growing on Bare Shale

Figs. 6 and 7 show the two other views of the "Black Wagon" mound. The former shows the north side, planted in 1907-8, while the latter shows the top of the mound looking north. The trees are mostly alders. The larger trees on the left were planted on Arbor Day, Dec. 17, 1909, while the smaller trees were located on January, 1908. The foreground is on fire underneath, so that there are only one or two trees growing there.

Trees Around as Well as In the Village

While it is impossible in an article of this nature to enter into all the details of this valuable scheme, it forms a useful text for an inquiry as to whether in connection with the waste lands in the United States adjacent to the mammoth iron and steel industries and mining centers, some attempt could not be made along similar lines. Arbor Day is recognized as a national institution, but it is time that attention should be focused more directly

on this phase of welfare work among our colliery and allied branches of industry.

It is pleasing to record the advance which has been made in Great Britain in this direction, an advance, the good effects of which will be felt in increasing strength as the years go on. With the example of the European nations above mentioned before us, and the widespread opinion in our own country that serious inroads are being made upon our forests by the advancing forces of industry, it is surely a wise proposal to consider whether a similar system to that described above could not with advantage be adopted here.

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Storage Battery Locomotives in Belgium

Storage-battery locomotives, similar to those which run on the 1666-ft. level, have recently been installed on the 1916-ft. level in part of the workings of the Chaumonceau mine of the Amercoeur collieries, Belgium. They are housed and charged in a room constructed of iron and ventilated by a separate air current.

Separate Tracks for Locomotives and Cars

The tracks have a grade of 0.3 per cent. The locomotives run on 24-lb. rails set at 20-in. gage and the cars run on a separate track, the rails of which are 17 in. apart. Oak ties, measuring 32x6.4x3.6 in., support the tracks. The ties are set at 20-in. centers. The trips consist of 24 cars, weighing 550 lb. when empty, 1430 loaded with coal, and 2090 lb. loaded with rock.

The charging of the batteries, being done at constant potential, requires no supervision. The current is led from the surface by a cable with two conducting wires, each of about 0.11 sq.in. section. As the junctions are male and female, it is impossible to interchange the poles in charging.

Description of the Locomotives

Each locomotive is about 14 ft. long, and 43 in. wide and 47 in. high. Its weight is 13,200 lb., the storage batteries themselves weighing 6160 lb. The motor is formed of a rigid frame surmounted by a casing containing the storage batteries. The side sills, with crossbars, end at the front and back in cast-steel buffer frames. These carry the bumpers which are cushioned with hempen cords.

The battery, composed of 40 elements, is inclosed in casings lined with lead and provided inside with lead pipes to drain off the acidulated water which may be spilled from the cells.

Each locomotive is equipped with two 5-hp. series motors, the speed reduction being accomplished by gears which run in a case filled with grease.

The housing of the motor, which forms at the same time the yoke connecting the poles, is of soft steel; it completely incloses the magnets, the armature, the commutator and the brushes, thus protecting all parts from dust and moisture. This housing is in two parts, connected by hinges which afford easy access to the interior. The motors, which are placed between the wheels, rest on springs, which themselves are partly sustained by the axles and partly by the frame.

Note—Translated by E. P. Buffet from a report by M. Ledouble in the "Annales des Mines de Belgique."

Controller

The controller is of the parallel type, permitting reversal of motion and the braking is electrical. The locomotive has, moreover, a mechanical brake, operated by a ratchet crank, and it is equipped at front and back with a 16-cp. electric lamp and reflector. An ampere meter and a voltmeter indicate the current consumption and state of the battery.

The accumulators, which are made at the mine, are composed of 40 elements of six positive plates and seven negative oxide plates. A positive plate weighs about 9 lb. after pasting and 5 lb. before. The plate measures 12x8x0.4 in. The negative plate weighs about 4½ lb. before pasting and 7 lb. afterward and measures 12x8x0.28 in.

The capacity of the battery is 350 ampere-hours. The locomotive consumes about 100 amperes when running and from 150 to 180 amperes when starting. The cost of hauling is about 3.35c. per short ton per mile.

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Increased Value of Ashes

Recently a Berlin inventor, S. Sborowitz, read a paper in the Exhibition Palace, in the "Spree-Athens," on a new process of his own invention, for making a new material out of ordinary coal and briquette ashes. According to his statement, this material has properties ranging from those of marble to those of india rubber, according to the method of treatment.

Sifted coal ashes, preferably those from briquettes, are mixed with water glass, copal varnish, and asbestos. The mixture is dried either in the air or by artificial heat.

To give the material the appearance of marble, the desired coloring material is added to the mass. Before drying, the material may be molded into any desired form. It is claimed, therefore, that the substance is highly resistant and may be chiseled, planed and sawed. Aside from being fire-, water- and acid-proof, it is a good insulator, and so hard that it will break marble.

It may be used for wall surfacing and for floors, for table tops, etc. It is said that a Berlin company has been formed to exploit the invention, and that 50 pfg. (12c.) per bucket of briquette ashes are being paid by this company.

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Why Sulphur is Found in Coal

E. E. Sommermeier, professor of metallurgy, Ohio State University, in the introduction to his book on "Coal, its Composition, Analysis and Valuation" makes the following remarks:

"If coal contained only the constituents which were present in the original vegetable matter, it would be uniformly low in both sulphur and ash. But during the early stages of its formation and when underneath the surface of swamps or lakes, streams or rivulets carried silt and sediment over the decomposing bed of vegetation, which sediment settled down and became an integral but varying constituent of the coal.

Sulphur in solution in the water, coming in contact with salts of iron and reducing organic compounds resulted in the formation and precipitation of pyrite, while other reactions not clearly understood produced variable quantities of organic compounds of sulphur as a constituent of the coal.

The Science of Good Management

By A. J. Reef*

SYNOPSIS—The answer to the problem of the "time-and-motion" loss in any industry is the one word "system." Methods employed in the various shops today may, with but little alteration, be applied to coal mining. The bonus system may be introduced with advantage to both employer and employee.

The claim advanced by Mr. Brandeis before the Interstate Commerce Commission that the application of scientific management to the railroads of this country would result in economies of $1,000,000 a day, and that this same science of management could be applied to practically every business endeavor, has directed public attention to a new propaganda in management and a new body of specialists in engineering.

The daily press and the popular magazines, which take no notice of technical matters except of a startling nature, have given much space to this movement.

Inquiry as to what this new element in management is, tends at first to confusion, for nomenclature and definitions of essentials and statements of principles still vary even with the recognized experts, and there are even those who deny that there is anything new about it.

What is Scientific Management

The name adopted by most of its advocates is "Scientific Management," not meaning that there is a science rather than an art of management, but referring to the use of scientific methods in management as opposed to "rule of thumb" methods. These methods are largely derived from a study of the science of physics and psychology.

In popular discussion we hear much of time-and-motion studies, and nearly every one is familiar with those studies, by which unskilled workmen, under skilled direction, are enabled, without frantic exertion, to load into cars four times as many tons of pig iron per day as had been the record before. How is it accomplished? The answer is by eliminating all useless motion, wasteful expenditure of energy and by taking rest for fixed lengths of time at fixed intervals.

One hears also of routing of work and material through factories, so that one department is not waiting on another; of systematizing the giving out of tools and materials by the use of requisitions and orders on a clerk of stores; of schedules of work for each machine or operative in a shop so that the least possible time may be lost changing from one job to another; of scheduling the work of the shop crane to fit this first schedule so that a tool and operative may not be idle waiting for crane service; of systems of daily reports; of cost and efficiency records; of standards of performance; of bonus systems of payment of workers; of planning functions being segregated in a separate organization.

All these things have part in scientific management in certain cases but not necessarily all of them in one individual case.

The essence of the new idea seems to be in attacking management problems in that same scientific spirit that has heretofore prevailed in the design of automatic machinery and engineering structures—by the methods of research, experiment and detailed study.

The Principle of "Transference of Skill"

The Subcommittee on Management of the American Society of Mechanical Engineers, in its recent report on this subject says, "A basic principle in the rise of industry is that of 'transference of skill'", meaning thereby the transference of the skill of the trained craftsman to the automatic machine tool. Careful study will convince one that this principle of transference of skill together with its concomitant, division of labor, has been largely if not wholly responsible for our present era of low-cost manufacture.

For years every large manufacturing concern has employed a designing and engineering force to work out this transference of human skill to a machine. The men of this force were the best talent obtainable and well paid. They used research in all sciences, experiment and detailed study to aid them. But usually the operating department was allowed to run the machines and turn out the product as seemed best to the operative or at most to the foreman.

Application of this Principle to Management

This new idea in management is merely the application of these same methods of operation, to the workmen, as well as the machinery.

Does it sound futile? Are you sure that the laborer, skilled though he may be with the traditional art of his craft, knows and practices the best and least laborious method of performing his task?

If one were attempting to design a machine to lay brick in a wall he would not hesitate to study long on the motions necessary. He would experiment with his machine, even at considerable expense, and would not balk at continued study to improve it. It is only rational then for the man who employs a human brick-laying machine to study and experiment how to lay them in the least time and with the least expenditure of energy.

One contractor made such a time-and-motion study and by applying its results cleaned up millions. His masons, instructed by him, and with scaffolding arranged to the best advantage, laid three times as many bricks per man as those of his competitors.

This furnishes a clean cut example of skill; not traditional skill of the craft, but real skill based on scientific research and experiment.

The report, above alluded to, renames this movement labor-saving management and draws the parallel with labor-saving machinery.

The Fundamentals of Scientific Management

Fundamentally then scientific management means three things: for every oft repeated operation, study in detail of all good methods of performing it; deciding on the best method; establishment of that method in practice.

*Victor-American Fuel Co., Denver, Colo.

Many other things follow from these. To the first and second steps we may add a bit of caution. A time-and-motion study is not always necessary to the decision. Even if necessary it should not be wastefully carried beyond the stage needful to a decision; neither should it be thoughtlessly applied to an occasional operation where the total saving would not justify it. The establishment of this best method as a standard, involves many of the auxiliary features of scientific management.

If a standard method is set up, standard conditions must obtain. The arranging of work to give standard conditions for the various operations for which the standard method is being taught is frequently a problem of no mean importance. The solution, however, will carry its own collateral benefits.

Workmen dislike change and particularly dislike being taught how to do their work. To obtain the establishment of new methods, particularly when these promise to turn out more work per man, usually calls for schedules of average work and payment of bonus for performance above that.

The maintenance and carrying into effect of these matters frequently calls for systems of reports, and always temporarily and sometimes permanently for additional clerical and supervising force.

There is no question also but that it means more work for the managing force, for in order to transfer skill, the manager must first acquire skill himself.

Application of Scientific Management to Coal Mining

No particular part of scientific management is new; time-and-motion studies were made in industries a hundred years ago; profit sharing is nearly fifty years old; but the scientific spirit in management which applies this principle of transference of skill to all activities in the industry consistently is at least recent.

Can we apply it to coal mining? The laying of a room switch on an entry is an oft repeated operation and so worth considering. How long does it take a track-layer and helper to lay one? Some managers may know. How long *ought* it to take them to lay one? I doubt if any of them know, and necessarily under ordinary operating practice they cannot know, because the conditions are so variable. The men may have to cut a rail to put in the frog or they may not. They may have to carry their tools a half mile to the job or not. They may have to wait for materials to be delivered or not. Laying a room switch is not a standard operation.

What is Meant by a Standard Operation

The first step in labor saving management is to make it one. Lay the main-line track so that the joints will come right for the room frogs. This will of itself partially standardize the laying of the entry track. Give the track-layer a schedule when he reports for orders in the morning, to cover his work for the day so that there is a minimum of moving between jobs.

Knowing how much moving there is to be done a definite time allowance for it can be made. See to it that the extra driver on the preceding day or night shift has hauled to the same schedule of places the track materials needed at each. Then so far as the variables mentioned are concerned the laying of that room switch is a standard operation.

Then begin a time-and-motion study and decide and formulate in writing the best method of doing it. Determine a reasonable time to do it by this method; teach your track-layer that method until it becomes habit. Make out a schedule for him for the day based on this determined time, and the moves to be made, and by means of a bonus payment for performance according to schedule keep him up to such performance.

Right here an attendant or incidental advantage is manifest. The workman of course cannot expect to equal that schedule and obtain his bonus unless conditions are up to standard and a spur to the management to keep them so is thereby automatically provided.

Not All Operations Can Be Standardized

Admittedly there are many operations in coal mining which can not be standardized even though oft repeated. Thus, although the basic idea cannot be carried to completion, some careful study and experiment may even here prove helpful.

If the making of the time-and-motion study seems inexpedient or if it should develop that the present method is the best that can be devised, advantage may still be taken of the knowledge that can be obtained of a standard time in which the work should be performed. In this way a schedule of daily tasks may be intelligently made up and used, without any bonus system.

This will afford an easy method of detecting any soldiering on the job. With conditions really made standard and the schedule intelligently made out, based on what a man ought to do, the superintendent will have a right to insist on the schedule being completed.

Many minor points in management which can be used will develop from the attempted application of scientific management even though it be found that the system as herein outlined is not applicable in its entirety to all the various operations of the industry.

The great essential to success in applying scientific or labor-saving management lies in the scientific, experimental attitude of the managing forces toward their problems, and making all the activities of the industry their problems.

Employment of Outside Experts

A word as to the employment of experts. Scientific management is not something that can be grafted onto an industry by an outsider. It begins in the spirit of the management forces, and belief in it and enthusiasm for it must reside there continually, if its application is to succeed. Nevertheless an outsider, granted managerial ability, coming fresh to the problems of the particular industry, can frequently see far more than those who are in it every day. His point of view is different. Also the work of making time-and-motion studies is best done by one with special training and their results are best evaluated by one with experience in using them.

The whole idea is so big that its ardent advocates seem unduly enthusiastic and from some of their writings one would imagine the movement a cult or religion. Like every new movement with worth it has its fakers; but these things should not detract from the real value in "labor-saving management."

CURRENT COAL LITERATURE

Relation of Subsidence to Packing

By Geo. Knox*

SYNOPSIS—Where flushing is used instead of pack-walling to support the mine roof, the miner is exposed to less risk at his work. The roof subsides over the pillar from one-tenth to one-eighth of the depth of the seam in room-and-pillar working. With flushing, the subsidence extends over the pillar more than one-third of the depth of the seam. Flushing reduces the emission of gas and cools the workings. It costs from 9 to 21c. per ton mined. The Krupps are extracting all the coal beneath their works and protecting them by flushing.

In extracting coal seams, there are two distinct types of supports to be considered, namely: (a) those left in the mined area for regulating the subsidence of the overlying strata; and (b) the temporary support between the permanent packing and the working face for preventing any sudden movement of the descending mass from breaking off, without warning, pieces of the lower roof strata. Attention has centred largely on the need for some system for the latter type of support.

Roof Support in Rear Has Bearing on Safety at Face

After personal investigations of the methods adopted at the Courrières and other continental collieries, I am of opinion that the careful attention paid to the packing of the worked-out areas, which accompanied the systematic timbering, had quite as much effect in reducing the accident rate as the timbering at the face.

When a layer of coal is being removed, it is subject to two forces, one, that of gravity acting downwards, and amounting roughly to about 1 lb. per sq.in. for every foot the coal is below the surface, and the other acting horizontally in a direction opposite to that of the workings. If the packing is inefficient, the downward weight acts suddenly and irregularly, breaking the roof strata by a series of "slip-faults," as shown in Fig. 1, and throwing a large amount of extra pressure on the edge of the solid coal at the face.

The resultant of the two forces, to which reference has been made, acts toward the region of least resistance, the area of extraction, thus forming planes of strain projecting over the solid coal. The area of subsidence on the surface, is, therefore, always greater than the area of extraction below it, and will vary according to the rate of advance of the working face, the nature of the overlying strata, the presence of faults, etc.; but the obliquity of the resultant of the two components forming these planes seems to be determined chiefly by the efficiency of the packing (Fig. 4).

*Lecturer in mining, Wigan and District Mining College, Wigan, England.

Note—Abstract of paper entitled "Relation Between Subsidence and Packing, with Special Reference to the Hydraulic Stowing of Goaves," read before the Manchester Geological and Mining Society, at a session held at Manchester, England.

Horizontal Draw

The distance that surface subsidence extends in advance of the working face (that is the amount of "horizontal draw") varies with the efficiency of the method of packing adopted. In room-and-pillar workings, where the roof is allowed to fall in as the props are withdrawn, the draw appears to be about a tenth to an eighth of the total depth; in longwall mines with good pack-walling, a quarter to a third of the depth; and where hydraulic packing is used, an even greater distance.

Where the draw is short, gravity acts freely, breaking the roof strata along the line of the coal face. Where it is increased, by the packing of the extracted area, the vertical force is partly arrested by the pressure of the horizontal force projected against the subsiding zone, which throws a greater proportion of the weight forward on to the solid coal, allowing gradual settling, with the roof unbroken (Fig. 5 and 6.)

The Change From Compression to Tension

As the coal at the face is being undercut, and the roof strata above leave the "solid" and enter the mined zone, a change of strain, from compression to tension, must take place in the rock particles. The nearer to the vertical, the line of strain approaches, the more sudden and violent will the reactions become between these forces in the roof strata at the face. To minimize this, the plane of strain should be thrown as far back as possible, as shown in Fig. 4, thereby increasing the horizontal pressure and allowing the reactions to take place slowly and evenly.

In opening out the workings in a partly packed seam, the only evidence of strain as the workings advance beyond the shaft pillar, is that of "thrusting" (Fig. 3) until a sufficiently large area has been mined to permit of the huge rock lever breaking through to the surface.

When this "first-weight" takes place, the strata will cut through at the face, up to the surface, as shown in Fig. 4. As each undercut is made, new fractures parallel to the first will be produced and the roof, instead of subsiding solidly and evenly on the packs, will probably come down in a series of jerks between the fractures.

The maximum subsidence is obtained when the packing is wholly inefficient. Under this condition it ranges from 30 to 70 per cent. of the thickest part of the seam. The minimum subsidence is from 5 to 10 per cent., this value being frequently obtained where the opened spaces are filled by flushing. When the subsidence is reduced to the lower figures and the roof strata allowed to subside gradually and evenly on the packs without fractures, better results may be expected from the application of systematic timbering than is obtained in present day practice.

With complete packing, this subsidence would also tend to prevent the drainage of large volumes of gas (and in many cases water) from the overlying strata

into the mines and thus another danger encountered in gaseous workings would be removed. Where the roof is completely packed, all the coal can usually be extracted, but even in cases where coal of a poor quality is left behind, it is impossible for gob fires to take place where flushing is used. Seams up to 40 ft. thick, in which gob fires formerly occurred with frequency when only partial packing was in use, are now being worked and completely packed by flushing without the slightest risk from gob fires.

Importance of Manner of Working

Large areas of coal have been lost through lack of attention to the cause of subsidence. Fig. 7 is an example where a series of pillars in a 9-ft. seam, covering an area measuring about 1200 yd. in length by 400 yd. in width, was rendered unworkable through the extraction of the pillars on the rise sides of the basin, allowing the strata to break to the surface, thus forming a huge rock pyramid which rested directly on the coal seam.

Fig. 8 is another example where a 6-ft seam was being worked from two different shafts towards each other. When the faces approached within 200 yd. it was found impossible to keep the strata from cutting along the faces, and filling up the roadways through the longwall.

In Upper Silesia over a hundred collieries have installed the hydraulic packing system in seams varying from 4 to 40 ft. in thickness, and have thus reduced the subsidence from 30 to 70 per cent. down to 0.3 to 7.8 per cent. of the total thickness of the seam. Spontaneous combustion (which accounted for the loss of 25 per cent. of the total area of coal) has been entirely prevented; surface damages have been considerably reduced, and a great saving effected in timber. The cost of packing varies from 9c. per short ton of coal extracted at Myslowitz, to 13c. per ton at Florentina colliery, and 14 to 16 per ton at the Kattowitz collieries.

In my opinion, the problem of safety in coal getting is largely that of regulating the subsidence of the strata and the same may be said concerning the saving of coal supplies. It is evident that the regulation of subsidence is largely determined by the efficiency of the packing used, and that the most complete system of support known is that provided by flushing.

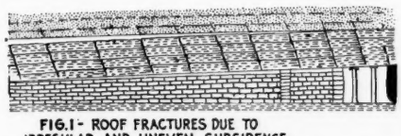


FIG.1 - ROOF FRACTURES DUE TO IRREGULAR AND UNEVEN SUBSIDENCE

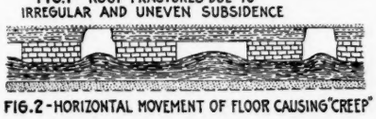


FIG.2 - HORIZONTAL MOVEMENT OF FLOOR CAUSING "CREEP"

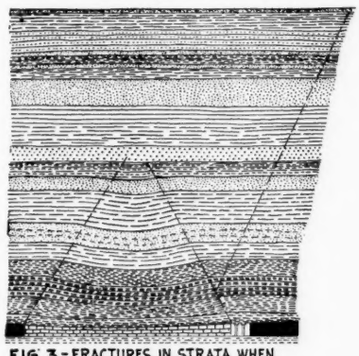


FIG. 3 - FRACTURES IN STRATA WHEN "FIRST-WEIGHT" TAKES PLACE

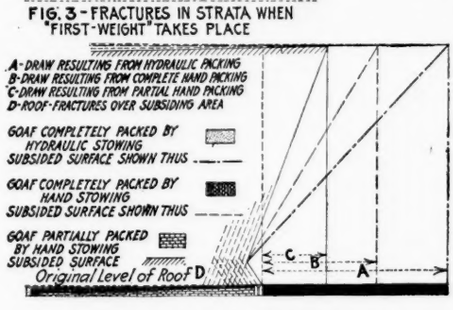

A - DRAW RESULTING FROM HYDRAULIC PACKING
B - DRAW RESULTING FROM COMPLETE HAND PACKING
C - DRAW RESULTING FROM PARTIAL HAND PACKING
D - ROOF-FRACTURES OVER SUBSIDING AREA
GOAF COMPLETELY PACKED BY HYDRAULIC STOWING SUBSIDED SURFACE SHOWN THUS
GOAF COMPLETELY PACKED BY HAND STOWING SUBSIDED SURFACE SHOWN THUS
GOAF PARTIALLY PACKED BY HAND STOWING SUBSIDED SURFACE
Original Level of Roof
C
B
A
D
FIG.4 - RELATION OF SUBSIDENCE, RELATIVE DRAW, AND EFFICIENCY OF PACKING

FIG.5 - METHOD OF HYDRAULIC PACKING TO THE DIP OF THE COAL-FACE

FIG.6 - METHOD OF HYDRAULIC PACKING IN FLAT WORKINGS

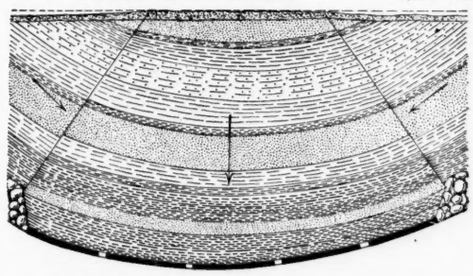


FIG.7 - LOSS OF COAL CAUSED BY SUBSIDENCE, RESULTING FROM BAD ARRANGEMENT OF WORKING

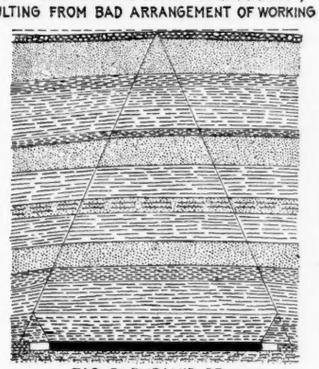


FIG. 8 - PYRAMID OF STRATA RESTING DIRECTLY ON TOP OF COAL

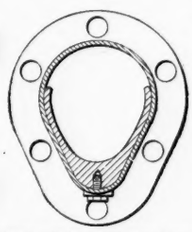


FIG.9 - OVAL PIPE WITH LINING

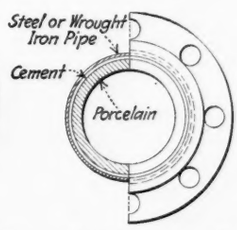


FIG.10 - PORCELAIN LINED PIPE

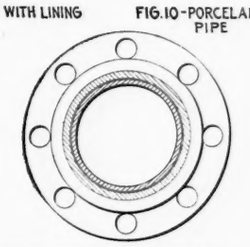


FIG.11 - IRON OR STEEL LINED PIPE

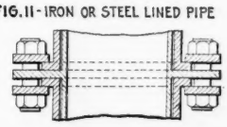


FIG.12 - SECTION OF JOINT OF LINED PIPE

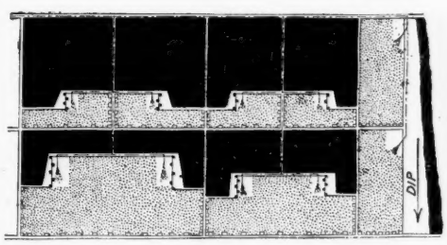


FIG.13 - METHOD OF WORKING BY LONGWALL AND PANELLING

It may not be altogether out of place to meet some of the more common objections against the introduction of flushing, which roughly resolve themselves under the following headings:—

Cost of Providing Packing Material

In newly opened coalfields, in the absence of a plentiful supply of material for packing, this might be a costly difficulty. Where mining has been in progress for many years, the huge refuse heaps provide a sufficient supply of suitable filling.

Where this is plentiful, it forms the cheapest and most

efficient packing material, costing in Upper Silesia from 6c. to 8c. per ton of coal raised; but where local weathered pit heaps are available the cost is said to be from 10 to 14 c. per ton.

In Essen and other thickly populated centers, the money saved in ground rents by getting rid of refuse heaps, and the saving of 7 to 9c. per ton for surface damages, reduces the total comparative cost of packing by flushing to a very small sum compared with the old system.

Where slag or other refuse has to be transported for considerable distances by rail, as at Saarbrücken, the cost may become as high as 18 to 21c. per ton—about 5c. per ton higher than for hard packing, but the difference is made up in the saving effected in the timber required.

Packing Flat and Unfavorably Inclined Workings

It is not so hard to pack flat or unfavorably inclined workings despite the accepted opinion. With a dip of 5 deg. or more (Fig. 5) and the flushing shaft on the rise side of the property, there is little difficulty experienced in carrying the packing material into the extracted area. In fact the material can be carried on a level grade a distance equal to from three to five times the pressure head according to the percentage of water used. Because of the excessive volume of water needed it is not advisable to force the material in the pipes uphill, although this is frequently done for a distance of 90 to 120 feet.

In flat seams, the flushed fill is kept in position by temporary timber dams, as shown in Fig. 6. These are raised sufficiently high across the pack area to prevent the flushed material from spreading too far forward. These boards are laid loose between two lines of props, and moved forward as the goaf becomes filled up.

Objections to Flushing Invalid

It has been objected that the use of large volumes of water underground, (a) would cause creep, (b) increase the cost of pumping, (c) be injurious to the health of the miners. It was also thought that in cold weather flushing would be difficult.

(a) Creep is the result of the movement of the rock particles in the floor from the point of greatest pressure which is under the pillar or pack, towards the point of least pressure which is the roadway or open excavation. The packs are forced by the weight of the overlying strata into the floor, the rock particles being translated horizontally towards the open roadways (Fig. 2.).

In flushing, the primary cause of creep can be reduced by the greater amount of support left in the mined area and the more even distribution of the total weight on the rock, as only a few roadways in longwall are necessary. Being usually applied to retreating methods of working, the wet floor is left behind.

As the old roadways are usually fitted with rubbish dams, and the water from the packing area is turned into them, they act as filter ponds and become silted up, thus completely packing all the mined area and reducing the tendency to creep.

(b) Where very little water is met with in the lower workings of the deep mines, the extra pumping would be a disadvantage, but the advantage already suggested, and the increased safety due to the damping of all coal dust in the vicinity of the working faces, would more than counterbalance the extra cost for pumping.

Flushing Lowers Mine Temperatures

(c) Regarding the question of health, hydraulic packing produces a cooling effect. It neutralizes the heat caused by the grinding of the coal in the pillars or of coal left in the extracted area. It prevents the rapid oxidation and heating of the fine coal dust which is produced by the crushing action of subsiding strata.

(d) There is no great difficulty in Great Britain, even in the coldest weather, in providing a water supply sufficient to make up any slight loss due to evaporation. The only other difficulty arises when the flushing is intermittent. In this case, the water in pipes near the surface is liable to become frozen when the flushing current is stopped; but this can be avoided by lowering the water in the pipes to a point where the temperature is high enough to prevent freezing.

Packing Very Thin or Very Thick Seams

In Essen, the Krupp firm is successfully extracting from underneath their railway works, railways, and large public buildings, 8 seams, varying from 20 in. to 5½ ft. in thickness. They are enabled to do this with impunity, owing to the completeness with which the workings are filled with flushed *debris*.

In Silesia, seams up to 40 ft. thick are being worked and completely packed, sometimes by panel-slicing the whole 6 thicknesses of seam and sometimes by longwall layers. Working is commenced from the bottom upwards and the goaf packed in each layer as it is extracted. The only disadvantage in thin seams, compared with thicker ones, is the frequency with which the flushing pipes have to be moved for a given amount of packing.

Maintenance of the Pipe Lines.

The greatest difficulty which had to be surmounted in hydraulic packing arose from the excessive cost of maintaining pipe lines and it has taken several years of experiment and practice to devise a suitable conduit capable of resisting the grinding action of the *debris* in the horizontal pipes.

There are practically only four types of pipe now in use, namely: (a) mild ungalvanized-steel pipes; (b) mild steel or cast-iron pipes lined with hard wood or steel (Figs. 11 and 12); (c) steel pipe lined with porcelain (Fig. 10); and (d) the Stephan system of oval steel pipes, with steel lining, or the Busch system with iron linings (Fig. 9).

Wood Lining Costs 52c. per Yard and Porcelain Pipes $3

The first system is still used in many continental mines where the plant was installed some years ago, and the second is utilized most successfully in Silesia and the Transvaal the cost of wooden lining being about 52c. per yd.; but in all new installation types (c) and (d) are adopted.

Porcelain-lined pipes will pass from 180,000 to 200,000 tons of material before they require renewal, and iron-lined oval pipes will pass 14,280 cu.yd. per hundredth inch wear of surface. The latter system would seem to be the most satisfactory yet adopted, the cost of lining being about $3 a yard.

There is a difficulty in adapting the system to mines now using hand-packing, especially where the workings are well advanced.

EDITORIALS

Watch for our statistical number next week. This special annual issue of COAL AGE will contain a complete review of all that has occurred in each state during the past year. Read it, and file it for future reference.

Special Power Number

On the first of February, the entire issue of COAL AGE will be devoted to the question of power at coal-mining plants. All of our readers are invited to contribute articles and letters adapted for publication in this special issue. If there is an uptodate power equipment at one of the mines in your vicinity, send us some photographs and a description of the most interesting points connected with this particular installation.

The Air Current a Factor in Mine Explosions

No one doubts for a moment that a strong current of air is an important factor in the initiation and propagation of a mine explosion, when the conditions in the mine are favorable for explosion of either gas or dust.

No one would essay to question the potency of a high velocity of pure intake air to augment the combustion of gas or dust in mine workings. A high velocity represents an energy that may, under favorable conditions in the confined space of mine workings, be transferred to and become a part of the energy of an explosive blast.

When, however, one reads the account of such experiences as are unfolded in the letters of Alexander McAllister, COAL AGE, Nov. 16, p. 692; Dec. 14 and 21, pp. 838 and 881; and again in this issue, p. 24, one is forced to the conclusion that the narration is simply phenomenal. It is more than remarkable. The question to be decided, and which we hope will be clearly discussed in the coming issues of COAL AGE, is: To what extent is this experience, as given by Mr. McAllister, of general application in coal mining, today?

The Mining Engineer

What constitutes a mining engineer? This question is often asked, because of the confusion growing out of many practical mining men styling themselves "Mining Engineers," after a few years' experience in making mine surveys and maps, or in planning and superintending the construction of mining plants and equipment. The idea seems to have gained some prevalence that all that is required to make a competent engineer is an experience of a certain length of time in the mines, in the line of work generally performed by the mining engineer.

The sub-committee of the Commission to revise and codify the present anthracite mining laws of Pennsylvania, in its report just made to the Commission, define the term "mining engineer" as follows:

> The term "mining engineer" means any person who is competent to survey and plot accurately the inside workings of a mine, and who has had ten years' practical experience at such work; or one who is a graduate of a school of mines or some similar institution, and who has had five years' practical experience in the mines.

While it goes without saying that there are many practical men, untrained in book knowledge and unacquainted with the theory and principles of mining but whose practical experience in the operation of mines has fitted them to successfully perform many of the duties that belong to a mining engineer, it still remains that these men are only specialists in particular lines of practical work. They are incompetent to design new machinery; plan new equipment calling for the intelligent application of known laws and principles; or to estimate accurately the efficiency of the ventilating system in the mine or the power plant on the surface. These duties require a mining engineer, who is *more* than a thoroughly practical and experienced man. He must be a man who combines in his personal equipment both the theory and the practice of coal mining.

We would suggest that the enactment into law, of such a definition of the term "mining engineer," would operate to weaken mine management and, incidentally, lower the standard of efficiency of all certified mine officials, because of the tendency, on the part of such practical engineers to eliminate theory and principles from mining examinations. The result would be to rapidly impair the conditions in the mine relative to the health and safety of the men employed and the security of property.

We would suggest that every mine examining board should include at least one graduated mining engineer of not less than five years' practical experience in gaseous mines. We cannot safely eliminate from mining practice the knowledge of the theory and principles of mining; these are essential to all branches of mining if economy and safety of operation are to be secured.

Class Legislation

All the coal-mining laws which have been passed in the United States have been written for the good of the miner. Except the provision that the operator may condemn rights-of-way over the lands of others, which is probably unconstitutional in most states, we do not recall any parts of the law which were or are favorable to the operator.

The law reads that he should do this and supply that and failing to do and supply these things, certain penalties are threatened against him and his agents. Perhaps some provisions do not cover all the dangers in the mine, some are perhaps not duly severe, some, it may be, bring too much force to bear on the foreman and too little on his employer.

But this is not the matter we have in mind. The main truth is that all the legislation hitherto passed has been in the interest of the workman and not in the interest of the operator. The laws were proposed and passed to

promote the safety, health, comfort and happiness of the miner, mainly at the expense of his employer. These laws were expected to put the mine owner to considerable expense and no one can deny that at least the charge for safety is large.

But we do not find that the workman is prepared to back up the laws provided for his sole advantage by insisting on their enforcement. He does not condemn openly those firebosses who fail to make inspections, he does not demand the discharge of men who leave mine doors open. he fails to hound those men who put in overheavy charges, who tamp with slack, who mix powders, who make tight shots in dusty mines and who fill cartridges with pipe in mouth or lamp on hat.

In fact, if men are discharged or arrested who do such things, the miners as a body go on a strike. The burden of enforcing these laws invariably is placed entirely on the operator and his officials. The workingman is either indifferent or hostile. Who cares? Not the men who are likely to be injured or killed, it is nothing to them. It is the operator's business, they think, to protect them, even though they will not obey the law.

When the first man to carry a safety lamp went into an English mine, he met a miner who, resenting the fancied foolhardiness of the stranger who would venture to carry a lamp of any kind into a mine, so gaseous that all lights were prohibited, prepared to brain him with his pick. Perhaps this British "coal hewer" had a better conception of a miner's need to enforce obedience to common sense than is found among many miners today.

The miners should be prepared to see that the law is obeyed. Morality and penalties restrain the operator, to the miner there is a third and larger restraint—personal interest. It is a foolish man who is blind to his own advantage and to his own safety.

We would expect to find that the workers who did not value safety would be driven from camp to camp as marked men and that official guardians of the miners who habitually neglected duties, they were hired to perform, would be drummed out of the society of the men whom they had betrayed and whose lives they had risked.

But we do not find any such disgust and dislike on the part of their fellows. After a while an accident occurs and then the operator and his unfaithful employee are visited with resentment. The men who have been well aware that the careless fellow was always indifferent to all laws and regulations are often over ready to blame an official who has had far less opportunity to observe the work of his subordinate than the men who make loudest complaint, and who was paying the man to do his work well, possibly not at all for the good of the company, but for the sole advantage of the men employed.

Roof Control

We publish today an article by George Knox, on the "Relation of Subsidence to Packing." It is reproduced because of the valuable facts relative to roof settlement, gob walling and flushing which it contains and not because we are impressed with the train of reasoning by which roof fracture is explained.

Perhaps the fear of the German technical training has overcome English discretion and has caused Great Britain to multiply her colleges unduly. This unhealthy growth may explain to us many of the obscurities in diction and much of the unsoundness in theory in an author who is styled lecturer in mining at an English college.

Wherever we were unable to understand what the author intended to convey, we left his wording in its pristine incoherence. Even when he talks the almost universal language of pure science, he is as hard to understand, because he is as severely involved, as our own Mary Baker Eddy of muddled memory.

Mr. Knox must surely pardon us if we do not believe that the roof breaks along the lines he suggests. We cannot grant him that peculiar tilted L fracture which he favors and we fancy he will find it hard to conjure the roof to follow the extraordinary course of breakage he has laid out for it.

He appears, from his drawings, to think that a measure will lie flat on a bed of coal and then bend down at maximum curvature along a given line. The whole theory of flexure is opposed to such a conception. All bendable bodies flex under load into continuous curves, the continuity being only broken when the elastic bodies break.

Every evidence points to the fact that a theoretical treatment of roof breakage is needed accompanied by experimental work in the mines and the stressing of rocks and models in a laboratory. The matter is one of great complexity, as the stresses vary not only with the movement of the face, but also with progressive demolition.

Before the coal in one part of the mine is even opened up, it is subject to variations of pressure due to the undulations of roof which mining in other parts of the workings create. The load on the coal must thus be greater or less than the immediate overburden provides. Where the roof, in bending, forms a trough, the burden is increased, where it forms a ridge the weight declines.

Then again comes a change when the coal tends to tear from the roof and form no longer a part of that composite beam. Later long rents form from the surface at the head of the primary undulation and underground at the center of the span. As the extension of these rents would involve their becoming wider, they cease to extend.

The beam across the opening and over the adjacent pillars becomes an arch from a structural point of view, and then various forces come into play, probably some tensions arising from the line of pressure leaving the middle third, longitudinal shears, which permit the measures to distort into such shapes that the arch can fail, overturning actions on the coal pillars and thrusts on other sections of the mine roof, causing greater subsidence in these than their own weight would occasion. Now and again, perhaps, the arch will fail a little and then the beam strains reassert themselves. Then the roof will crack further and the arch strength once more come into play.

Thus at last demolition occurs and a number of forces thus deprived of their balances tend to work havoc on other parts of the mine roof. If the nature of the roof's resistance did not change in the course of its demolition, the first break would be the last, as rapid as the failure of a girder in a testing machine.

The mine roof is in need of its Navier, Saint-Venant and Clerk Maxwell, and both theory and nomenclature call for development. The use of the word "draw," for instance, to cover both the area affected by tension and the tension itself, is even more confusing than the early indiscriminate use of "stress" and "strain."

COLLIERY NOTES AND COMMENTS

The use of animals for haulage purposes underground is generally unprofitable if the distance to be covered exceeds 2000 feet.

If an electric mine locomotive is not giving the best results, examine the overhead work, as upon the character of this work depends to a great degree the success of the locomotive.

Borehole explorations have shown that the Appalachian coal basin has an area from 50 to 75 miles wide, barren of commercial coal. This begins north of Pittsburgh and extends through Ohio, West Virginia and into Kentucky; in the latter state it is 25 miles wide.

Increasing the life of mine timbering not only saves the value of the timber, but also saves on labor needed for frequent resettings, and eliminates the worry and risk incident to such operation. Only timber so situated as to be free from the danger of crushes can be profitably treated with preservatives.

When choosing a rescue apparatus give consideration to the following points: Weight of apparatus, capacity, strength and durability, liability to derangement in use, simplicity of construction, comfort in wearing, regulation of supply, facility of communication, safeguards for return, ease in cleaning, initial cost, and cost of operation per hour.

Under no circumstances should a miner be allowed to enter his place until it has been examined. All miners and laborers, before going to their working places, should be compelled to report to the official whose duty it is to make the early morning examination. This rule should be unbreakable and if ignored should be followed by prompt dismissal.

According to George S. Rice, engineer in charge U. S. Bureau of Mines, Pittsburgh, Penn., there is an opportunity for concrete ties, if they can be adapted to the conditions in the main haulage-ways. If made light and durable, they could be used for temporary room ties and taken up and relaid like rails in another part of the mine when the room is worked out.

A great deal of unnecessary wear in the working parts of machinery could be avoided if the nature and application of the lubricants were properly studied. Too much oil should never be used, and it should be the special care of the workman to see that it is uniformly distributed and regularly applied. One dry spot on a bearing causes heat, and cutting is sure to follow.

Some time ago a fatal accident occurred, due to a miner heating his explosive in an oven. This is perhaps a much more common method of "getting the explosive into condition" than is usually suspected, and among others is that of carrying the explosive next to the body. The miner who is guilty of this habit is a walking danger, not merely to himself, but also to his companions.

The advantages and disadvantages of fixed screens used in the preparation of anthracite coal are: Advantages—(1) Low first cost. (2) Run with very little attention. (3) No power is needed to run them. (4) Large capacity. Disadvantages—(1) Do not screen the coal as perfectly as might be desired. (2) Need of additional breaker height to accommodate the pitch. (3) Breakage and loss of coal due to the drop at the lower end.

As the pressure increases with the depth of mining, so will the proportion of large coal decrease. This is clearly recognized, and it may be moderated by laying out the workings so as to take advantage of the cleavages. Also by the method of holing and packing, and by avoiding downhill falls in seams with much dip. It is further held to be especially desirable to work at a uniform rate with just sufficient pressure to help in bringing down the coal. Stopping the workings for a time is generally detrimental.

Comparing methods of working, Joseph Dickinson, a British mining expert, informed a coal-supplies commission that he favored the longwall system, but stated that there are considerations which have to be taken into account with regard to all mines. If there is no material in the seam for stowing and packing, it may be necessary to use the room-and-pillar system. As regards cost, there may not be much difference between the two systems, but on the question of the quality, the longwall method will probably produce the best coal.

The importance of accurate work in the surveying department of a coal company is obvious when it is remembered that mistakes are liable to cause great loss of mineral by bringing down the overlying strata in the vicinity of faults and loose ground, also through flooding in piercing old workings in front or overhead. Such mistakes also lead to trespass actions, the loss of coal through leaving extra-thick pillars and an increased length of haulage. Care, accuracy and attention to details should be the characteristics of a good mine surveyor.

Regarding the limit of depth in mining, Joseph Dickinson said: "Some people are talking now of 5000 ft.; I think the possibility is that it may be obtained hereafter by means of deeper shafts, and taking the men out and allowing them a little respite and time to cool; also the use of some of these cooling adjuncts. I do not know what effect an ice arrangement or liquid air will have, but compressed air, when liberated, will freeze the small valves of an air machine. We have by no means exhausted the cooling powers within reach of the collier."

Crush and upheaval naturally increase with the depth. To certain depths, varying with the degree of hardness, the increase may be moderated by increasing the proportion of pillars, and in all kinds of work by varying the direction of the working. Soft seams with slippery faces, begin to crush in narrow openings at a depth of about 500 yd.; in some instances, both in narrow and wide work, large outbursts of crushed coal occur suddenly from the unworked portions of the seam beyond. Such outbursts are often accompanied by firedamp, and may occasionally be avoided by boring in advance, or in the roof or floor.

Explosives should be handled with great care, and it is well to keep in mind the eight causes of accidents when shotfiring, quoted by Prof. Courtenay de Kalb: (1) A hole missing fire; driving a wedge near the hole two days later has been known to explode the charge. (2) Using a short fuse to hasten explosion has exploded the charge before the workmen could retreat. (3) Smoking a pipe while charging a hole. (4) Loading a hole with the aid of an iron needle. (5) Firing a charge in a hole to clear it of water, and immediately reloading. (6) Ramming a charge in a hole with an iron crowbar; also tamping a charge with an iron bar. (7) Drilling out a misfire shot with a blunt drill. (8) Forcing a cartridge in too small a hole.

The British Mine Inspector, R. A. S. Redmayne, is of the opinion that it would be advisable to eliminate safety catches, and to substitute chains in place of the rigid rods at present used for suspending the cage from the rope. He also advocates having the former systematically annealed at stated periods. Such safety catches as are now in use constitute a doubtful safeguard and may actually be a source of danger. This was shown by Inspector Walker in connection with the inquiry into the Barrow colliery shaft accident. He said: "The engineer did not run the cage at the same speed all the way down, and the safety catches partially acted with the result that the rope accumulated on the top of the cage until the weight became such as to cause the cage to drop."

The Yorkshire mine inspectors have long held the view that miners should not be allowed to keep gunpowder in their homes. Explosives should be supplied by the owners themselves, and the following case is to the point: The manager of a South Yorkshire colliery, who was bound to use a "permitted" explosive, thought the men were buying their explosives outside. He had them searched and found that they were taking in gunpowder wrapped up with their meals and in their pockets. Even the British miner is partial to this class of powder, but as is known, under certain conditions it is dangerous to use it in mines; in this particular mine it was prohibited by law. There had already been one explosion, and the result of the foolish conduct of the men might very easily have caused another.

DISCUSSION BY READERS

Carbon Monoxide Produced by Explosion of Methane

I was interested in reading the answer to the examination question, COAL AGE, Nov. 23, p. 732, which reads:

> What would be the probable composition of the explosive mixture, if the afterdamp of the explosion shows the presence of whitedamp, instead of blackdamp, and why?

The answer to this question states as follows:

> . . . . The complete combustion of the carbon requires a volume of air practically nine and one-half times the volume of the marsh gas. This proportion denotes the maximum explosive point of the firedamp. When the firedamp mixture contains a less proportion of air, the combustion is incomplete and whitedamp is formed.

Now, the complete combustion of methane in air is expressed by the formula,

$$CH_4 + 2\ O_2 + 8\ N_2 = CO_2 + 2\ H_2O + 8\ N_2$$

From this equation it is apparent that two volumes of oxygen (O_2) are required to burn one volume of methane (CH_4); or, what is the same thing, for the complete combustion of the methane, the firedamp mixture must contain 9.46 per cent. of gas and 90.54 per cent. of air.

My own experience confirms that of Dr. Broockmann's, namely, if more than 9.46 per cent. of methane is present and less than 90.54 per cent. of air, there will be no carbon monoxide (CO) formed by the explosion of the firedamp mixture, but the afterdamp of the explosion will contain some unburned methane (CH_4). Again, if more air is present and less gas than the proportions stated above, oxygen will be found in the afterdamp.

In most gas explosions in mines, dust is also present; and, as a result, carbon monoxide (CO) is found in the afterdamp of mine explosions. In one case, in my own experience, where only gas was present, a sample of the afterdamp taken for analysis did not show any carbon monoxide.

HENRY BOCK.

Denver, Colo.

[In answer to the remarks of our correspondent, we would draw attention to the discussion of the same question, in the excellent paper, "Notes on Explosive Mine Gases and Dust," by R. T. Chamberlin, being the original Bulletin No. 383, of the U. S. Geological Survey and reprinted as Bulletin No. 26 of the Federal Bureau of Mines. This bulletin, pp. 11-14, gives a full discussion of the possible composition of afterdamp. The bulletin, p. 12, refers to the apparently as yet unsettled question in regard to the combustion of methane in an atmosphere containing an insufficient amount of oxygen for the complete combustion of the gas.

As indicated in Mr. Chamberlin's bulletin, the conclusion of Dr. Broockmann that carbon monoxide *cannot* be formed by the combustion of pure methane in air, even though the quantity of air present is insufficient for the complete combustion of the gas, does not seem to have received sufficient corroboration for its general acceptance. The early experiments of Dr. J. W. Thomas, corroborated by the later experiments of the French Firedamp Commission, led by the eminent mining experts, MM. Mallard and Le Chatelier (1882), have since been further proved and endorsed by the able experiments of G. A. Burrell, chemist of the U. S. Bureau of Mines.

The experiments of Mr. Burrell are fully explained in a paper read by its author, before the Coal Mining Institute of America, Pittsburgh, Penn., Dec. 20, 1911. (COAL AGE, Dec. 23, 1911, p. 348.) We quote from this paper as follows:

> In these experiments pure methane was prepared and mixed with air in such proportion that not enough of the latter was present for the complete combustion of the methane. The mixtures were then exploded and the products of combustion examined. The most explosive proportion of methane and air contains 9.46 per cent. of methane. When the latter is increased above this figure, certain products are formed, about which there has been some disagreement. Some investigators have gone on record as saying that no carbon monoxide is formed.
>
> According to these experiments the carbon monoxide and hydrogen increase, and the carbon dioxide decreases as the methane content of the original mixture is raised.

The following is quoted from "Mine Gases and Explosions," Beard; p. 130:

> . . . . The increase of carbon dioxide and decrease of carbon monoxide, as the proportion of air to gas is increased, is shown by the following results (Thomas):
> Gas to air:
> 1:4.5; 10% carbon forms CO_2; 90% forms CO;
> 1:5.0; 13% carbon forms CO_2; 87% forms CO;
> 1:6.0; 20% carbon forms CO_2; 80% forms CO;
> 1:9.57; all the carbon is converted into CO_2.
>
> The point of complete combustion is reached when the proportion of gas to air is 1:9.57 (9.46%), when all of the carbon of the marsh gas is burned to carbon dioxide; and all the hydrogen is converted into water vapor, ...

In an article entitled "Methane in Coal Dust Explosions," COAL AGE, Feb. 17, 1912, p. 609, F. I. Wilbur, another reference will be found to the claim of Dr. Broockmann. It is the opinion of COAL AGE that until further proof is presented to the contrary, it is better to place confidence in the earlier experiments of Thomas, as corroborated by the French Firedamp Commission and the U. S. Bureau of Mines.—EDITOR.]

Reducing Ventilation at Firing Time

Continued from Dec. 14, p. 838.

When the Western Coal & Mining Co. requested me to go to mine No. 15, Dec. 1, as mine foreman, the mine was a complete wreck and the miners were moving away from the place, there being less than fifty per cent. of the men left now to operate the mine. I agreed to take charge of the mine, provided I was allowed to manage the mine without any interference in using my method of preventing explosions. Myself and Inspector Gilday made an examination of the mine Dec. 1, 1912. The fan was out of commission; all the stoppings, doors and overcasts, were destroyed. We found a heavy air current circulating in the mine, 78,000 cu.ft. per min.

I employed some sixty men to build stoppings and made the repairs necessary to put the mine in working condition. When this was done I found that with the fan stopped I

had a natural circulation of 32,000 cu.ft. of air per minute, which I considered a dangerous condition. I therefore had carpenters seal up the air shaft with heavy folding doors, hung to fold down and close the upcast shaft during firing time. For this I was criticized by the mining men of that section, who claimed it would be murder to allow any person to enter the mine under those conditions. I stated through the press, at that time, that I would be responsible for any explosions at the mine and would guarantee to fire all shots.

The steam and water pipes were destroyed by the last explosion and I did not replace them. Every part of the mine contained a heavy coating of highly inflammable coal dust. The first night, I found nineteen shots in the danger zone. These shots were charged with an average of 5 lb. of black blasting powder and tamped with coal dust and fuse. I invited the critics to come to the mine and see the results. Over one hundred of them came. I closed the doors over the upcast shaft, shut down the fan, and, going down, lit those nineteen shots, at one lighting. There were no windy shots or any explosions. The mine was only 220 ft. deep, and the people on the surface claimed the nineteen shots went off in less than one minute. I fired all the shots each night and, in some cases, had twenty-five ignited at one time.

I succeeded later in hiring two men to do the shotfiring, by paying them each $8.00 per day, and agreeing to accompany them while they were performing their work. I had safety holes cut in the solid coal, in the danger zone, for the shotfirers' protection. When they had become convinced that there was no danger of an explosion, I told them that I considered the mine a fine testing station, and got them to agree for me to make some tests. This was in the month of December. The first test I made was with the doors closed and twenty-seven shots prepared as before, in the danger zone.

We next established stations at intervals of 25 ft., from the face of the entry toward the shaft bottom. At each station, we placed a timber, and nailed some fine paper to the timbers. My object was to find out how far the flame would extend under those conditions. I then placed one 25-lb. keg of Du Pont blasting powder, at the face, with a fuse attached, and covered the powder up with fine coal dust. I wished to find out if it was possible to ignite this dust and cause an explosion under these conditions. I went on top, closed the doors and spread newspapers over them and set several empty cans on top of the doors. My object was to discover if a vacuum or a pressure was caused by this method. I stationed two persons close to the fan to watch the result. The shotfirers and myself then went into the mine and ignited those twenty-seven shots and the fuse attached to the keg of powder. We retreated into the safety hole to watch the results. An explosion started as the fourth shot went off, but it stopped and the rest of the shots went off. On going to the surface we found that the cans were not moved, but the newspapers were drawn into the crevices in the doors, which showed a vacuum was created by the explosion. I opened the doors, started up the fan, and went into the mine to ascertain what had occurred there. We found the track covered with dust, 500 ft. from the face of the entry. We found the flame had extended for 275 ft. The timbers and everything showed there had been much flame.

Two days later, the superintendent instructed me to remove the doors from the top of the upcast shaft, and place doors on the main-return airway to give the same results. I refused to do this and immediately tendered my resignation. He refused to accept my resignation, but agreed to assume all responsibility if I would make this change. As I still refused, he ordered the blacksmith and carpenter to remove the doors, which was done. He then ordered the men to put a door on the main-return airway and that was done. I sent for the shotfirers and the mine committee and informed them of the change the superintendent was making. When the day's work was over and the men were hoisted the mine committee, the shotfirers and myself went into the mine to note the conditions as changed. We found a strong air current on the south side of the mine, the second south being in the danger zone. I explained the danger in that entry, and added that I would not fire a shot in this entry for $5000, under those conditions. Returning to the bottom, I asked the shotfirers to refuse to fire shots under those conditions, and told them an explosion would occur if they did. The mine committee and myself then went to the surface and I had sworn statements made by them as to the instructions I had given of this danger.

The shotfirers meanwhile held a consultation between themselves and decided to fire that entry first, to prove that I was right in my prediction. They went to the second south and lit two shots and a terrific explosion occurred. At the time of this explosion, one of the cages was resting on the bottom, the other being up at the upper landing. This cage was forced through the headframe, breaking one of the sheave wheels. The other cage was buried in wreckage, the shaft buntings and guides were blown out. At the fan shaft the fan drift and buildings were destroyed; the stairway was blown out the top of the shaft, and all means of rescue were destroyed, except the steel rope, that was attached to the cage on the bottom.

I at once procured a lamp and a wet cloth and slid into the mine by the steel cable and made direct for the second south. All stoppings, doors and overcasts were destroyed in the mine. Natural ventilation had set in, however, and I found in the center of the main south entry a small tunnel, formed by the rush of air through the gas-filled mine. When I at last succeeded in reaching the safety cellar in the second south the men were not there. I made an attempt to get further in to locate them, and heard one of them struggling. I rescued him, brought him into this air tunnel and, returning, found the other and brought him to the same place. I left them there and went to call assistance. By this time, willing hands had procured a block and tackle and lowered men with restoratives. In two hours our efforts were rewarded by the men being in a condition to be brought to the surface.

The following day, I agreed to take charge of the mine again, if allowed to seal up the upcast shaft. This was done and there were no more explosions. I held this position until the following March, 1908, when I resigned. These are but a few of the tests that were made by me on the question of reducing the ventilation at firing time.

ALEXANDER MCALLISTER,
Croweburg, Kan.

INQUIRIES OF GENERAL INTEREST

Danger Signals in Mines

The revised bituminous mine law of Pennsylvania (Art. 3, Sec. 3) requires that danger signals, in all mines, shall be uniform and of a design approved by the chief of the Department of Mines. Will you kindly inform me what kind of danger signals are required and where these can be obtained. We have been using a board laid across the track marked with chalk "Danger, Keep Out." It would seem from the reading of the mine law that this is not sufficient, at the present time.

MINE FOREMAN.

Punxsutawney, Penn.

One of the important provisions of the revised bituminous mine law is the requirement that all danger signals shall be uniform. The old bituminous law required that all dangerous places be "fenced off and proper danger signal boards so hung on such fencing that they may be plainly seen."

The difficulty is present, however, that the large class of foreign labor employed (many of whom cannot speak or write the English language) fail to understand the old signal board, or comprehend the danger it points. As a consequence, there have been many avoidable accidents due to this class of labor not being properly warned.

Another difficulty is presented in the fact that men going from one mine to another are unacquainted with the danger signals used in different places and fail to familiarize themselves with the change in methods and conditions. They are, on this account, exposed to many dangers that a uniform system of signals would avoid.

FIG. 1. DANGER SIGNAL APPROVED BY THE PENNSYLVANIA DEPARTMENT OF MINES

This matter has received the careful consideration of many mining departments. The chief of the Department of Mines in Pennsylvania draws special attention to the matter of uniform danger signals as required by the bituminous mine law, in the bituminous Report (1911), recently issued. In this report Mr. Roderick states as follows:

In compliance with this provision and after a general consultation with operators and inspectors as to the kind of danger signals that would be most suitable for all persons concerned, I approved the signal designated in the following letter, which was sent to every superintendent in the bituminous region:

Dear Sir—In accordance with Sec. 3 of Art. 3, of the Act of June 9, 1911, which demands that danger signals in all mines shall be uniform and of a design approved by the chief of the Department of Mines, I have approved a signal of which a sample is inclosed herewith. The size recommended for the signal is 10x30 in., with an oval circle in the center, 10x14 in. The word DANGER appears in the middle of the circle, in white letters. The color inside the circle is red, and the color outside is black. . . . .

The last paragraph of Sec. 1, Art. 5, reads: "The meaning of all danger signals shall be explained to the non-English speaking employees of the mine, in their several languages, by the mine foreman, assistant mine foreman, or fireboss, through an interpreter."

A sample signal should be placed at a convenient point on the surface so that the non-English speaking employees can see it and be taught what it means when placed in any entry or at the entrance to a room or the entrance to any place in the mine where such signals are likely to be found.

JAMES E. RODERICK,
Chief of Department of Mines.

Harrisburg, Penn.,
Oct. 31, 1911.

The form of signal board approved by Mr. Roderick is shown in Fig. 1, with the exception that the red background within the circle is here shown in black, and the black outside the circle is hatched in the figure.

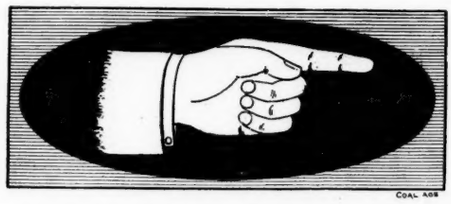


FIG. 2. UNIVERSAL SIGNAL POINTING WAY OUT OF MINE

All practical mining men will heartily approve of the suggestion of "uniform danger signals." The form approved by the Pennsylvania Department of Mines appears eminently appropriate for the purpose. In this connection, we would suggest another uniform signal board, similar to the danger board just mentioned and shown in Fig. 2, consisting of the black board with the same red circle and a white hand pointing always in the direction men should take to escape from the mine. Many of the recent mine disasters have demonstrated the necessity of pointing the way of escape, at numerous points on all travelingways throughout the mine. For this purpose, a board with a hand, the index finger pointing the way out, would be readily understood by every man. As stated in Mr. Roderick's letter, a sample of the board should be placed in a conspicuous place on the surface, and its meaning fully explained to every employee and particularly to the foreigner who does not understand English. As far as possible, all signs should indicate their meaning by their form rather than by words.

The only firm we know who makes a specialty of danger and other signs for mines is the Stonehouse Enameled-Steel Mine-Signal Co., Denver, Colo. This company has made a specialty of producing indestructible signs of charcoal-rolled steel, the enameled lettering being fused on the sign at a high temperature, which renders the sign impervious to all underground conditions and enduring.

EXAMINATION QUESTIONS

State Civil Service Commission

EXAMINATION FOR MANAGER OF MINE RESCUE STATION
Springfield, Ill., Oct. 3-4, 1912.

(Selected Questions Answered by a Successful Candidate, by Request of COAL AGE*)*

Ques.—Explain the general principles upon which mine-rescue breathing appliances operate.

Ans.—The general principle of all mine-rescue appliances is to supply the wearer with oxygen and absorb the carbon dioxide and moisture contained in the air exhaled from the lungs.

Ques.—There are three different types of rescue apparatus used at the Illinois stations. Describe the construction and operation of each of these types, giving their essential points of difference. Tell which you consider the best, and why.

Ans.—The three types of apparatus in use at the rescue stations, in Illinois, are: the Draeger, Westphalia and Fluess. The principles on which the Draeger and Westphalia operate are much the same. They use the same chemicals, soda and potash, in the regenerator. Both of these types now use the helmet or the mouth-breathing attachment and deliver the same amount of oxygen per minute. The Fluess has no helmet and is confined wholly to the use of mouth-breathing attachment. The chemical used in this regenerator is caustic soda. The regenerator is equipped with a by-pass valve, which is a decided advantage over the other types, for the reason that if the reducing valve should get out of order this valve can be used to fill the breathing bag. In the latest make of the Draeger type they have added a by-pass valve.

Each type has its special advantages. Some men cannot use the mouth piece as it makes them gag. The advantages of the mouth-breathing type of apparatus are the following: They are more convenient for use when the atmosphere contains no irritating gases, as the condition of roadways can be more easily examined, and the wearer keeps cooler than when wearing a helmet.

The disadvantage of the mouth-breathing types is the absence of the protection afforded by the helmet. Helmets are better when the air contains fumes given off from fires. Men can talk to each other, which cannot be done when using mouth-breathing apparatus. The dangerous feature connected with helmets is that if the atmosphere contains no irritating gas, but will not support life, leakage is not easily detected and the wearer may be overcome. Leakage usually occurs around the face band, and is more apt to be present than in the smaller mouth-piece of the other types.

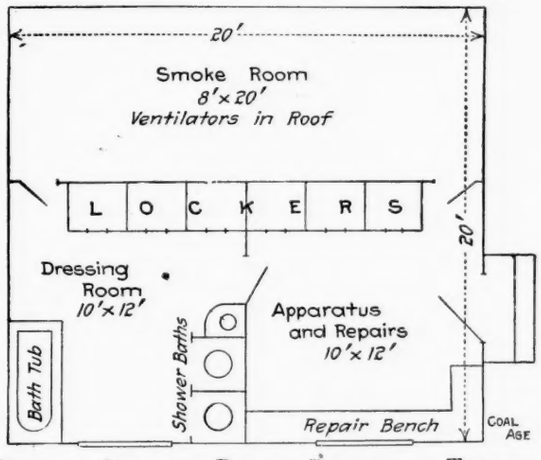
Ques.—(a) How much oxygen per minute does the average normal man require? (b) How do you determine the amount of oxygen the apparatus is furnishing?

Ans.—(a) It is estimated* that a man requires under normal conditions, when at rest, 263 c.cm. of oxygen per minute, which is increased by violent exercise about 8 or 9 times, making $8 \times 263 = 2104$ c.cm.; or, say the required amount of oxygen in mine work would be $2104 \times 0.06102 = 128$ cu.in. per min. The quantity generally stated by the manufacturers of the apparatus is 122 cu.in. per minute.

(b) Attach a measuring bag to the inhalation tube leading to the helmet or mouth-piece; then open the exhalation tube, turn on the oxygen, and note the time required to fill the bag. The volume should not be less than 2 liters (122 cu.in.) per min.

Ques.—If asked by a mine superintendent to advise him how to plan and equip a training station, at his mine; what plan of station would you suggest, and what different appliances would you advise him to get?

Ans.—I would advise him to erect a building 20x20 ft., having no less than three rooms; a room for apparatus



PLAN OF PROPOSED RESCUE STATION OR TRAINING BUILDING AT A MINE

and for making the necessary repairs; another for shower baths and lockers; and a larger room to be used as a smoke chamber. The following are the dimensions I would recommend; as shown in the accompanying diagram: Smoke Room 8x20 ft. and each of the other rooms 10x12 ft. This makes a very compact arrangement all under one roof.

The approximate cost for building and equipment, including six sets of breathing apparatus, oxygen storage tanks and pumps, electric and safety lamps, pulmotor and other necessary equipment, would be about $3000.

Ques.—What effect is produced on a man by breathing air that contains as much as 5% of carbon dioxide (carbonic acid gas)?

Ans.—The effect produced by breathing air containing 5% of carbon dioxide (CO_2) would be to cause the head to ache, and the man would soon begin to get dizzy and have pains in the back, chest and limbs, and breathe with difficulty.

*Mine Gases and Explosions—Beard, p. 184.

SOCIOLOGICAL DEPARTMENT

Novel First Aid Splint for Fractured Limb

By JAMES G. JONES*

As a member of a first-aid corps in the anthracite region, I have recognized for some time the want of a combination splint which could be used for a dislocated hip. This as all first-aid men know is a difficult part to secure properly. After considerable thought, I planned and constructed a splint for use in such cases.

When first-aid squads, without this appliance, were called upon to dress a dislocated hip it was necessary to secure three splints, one about 4 ft. 6 in. long and two measuring about 3 ft. and the necessary padding. It was then necessary to turn the patient over on his side

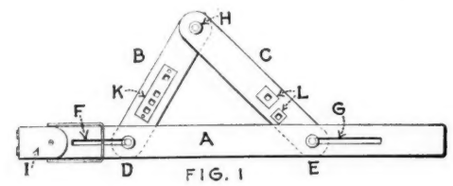


FIG. 1

FIG. 2

FIG. 3

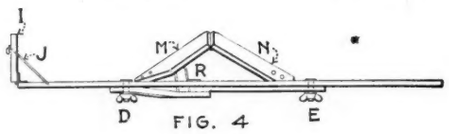


FIG. 4

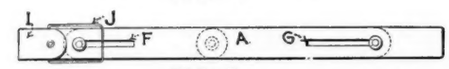


FIG. 5

COAL AGE

THE JONES SPLINT FOR COMPOUND FRACTURE

to get the proper measurements, after which the splints were bound together and applied with the padding to keep the leg in position.

In many instances the men were compelled to waste time in hunting for old clothing and other suitable material for padding purposes. With this combination splint, less padding is needed. It is unnecessary to take the measurement of the patient's leg and hence he is not kept in suffering while splints and padding are being prepared.

The device is constructed so that the side support can be extended or shortened to any desired length and raised or lowered to the level at which the limb of the patient may be comfortable. Its most important feature is its wide range of use. While constructed principally for a dislocated hip, it can be taken apart and used for any fractured limb or fore limb. In addition it enables the first-aid men to prepare the patient promptly for transportation, thus reducing suffering to a minimum.

It can be used for either the right or left leg by reversing the rise splint as can easily be done. Where it is found that the patient must be carried any great distance without a stretcher it can be locked by tightening the bolts thus rendering it unnecessary to depend on bandages to hold the splint in place.

[Fig. 1 shows a plan of the splint as seen from above. *A* is the long or main splint and *B* and *C* are the extension splints which are made adjustable by thumb screws *D* and *E* (see Fig. 4) which pass through the slots *F* and *G*. *B* and *C* are pivoted at *H*. The main splint *A* is 4 ft. 6 in. long and at one end is a foot rest *I* which can be turned up as shown in the side view Fig. 4 and secured by the bridle wire *J* as also shown in that figure.

In limb *B* of the extension splint is a countersunk plate with four slots *K*, and in the limb *C* are two small plates carrying slots *L*. Fig. 2 shows the rise splint also consisting of two parts *M* and *N* having lugs *O* and *P* engaging in slots *K* and *L*. The two parts are hinged at *Q* and are supported by a V-shaped wire *R*, hinged at *S* and provided with extension clamps *T* and *V*. This enables the rise splint to be supported at any angle. Fig. 3 shows this splint as it appears when folded. Fig. 5 shows the whole apparatus collapsed so that it can be put away.—EDITOR.]

Note—Paper read before the Panther Valley Mining Institute, held at Lansford, Penn., Nov. 2, 1912.

*Mine foreman, Lehigh Coal & Navigation Co., 22 Patterson St. Lansford, Penn.

English Miners Object to Fuses

Practical miners in northern England are taking exception to some of the clauses in the recent order in regard to explosives which attended the advent of the Coal Mines Act, 1911. They argue that the use of fuses in nongaseous mines is totally unnecessary from the point of view of safety, but they admit that in wet places it is often convenient.

It is recalled that in the old days thousands of shots were fired by the home-made straws, and with practically no risk. Squibs have supplanted these and are much more effective, being the acme of safety where there is no gas present.

The present complaint is, that, to compel miners in pits free from gas to use fuses to prevent an explosion of gas, and at the same time allow them to rush about the working place with a flaring candle in their hands, is a trifle ridiculous. A deputation from the workmen presented their case to the Home Secretary, and he agreed to appoint a small expert committee to inquire into the facts.

Meanwhile the order has been modified somewhat; a fuse may be ignited in naked-light mines by a naked light, subject to certain conditions. Special provision is made in regard to shotfiring on roads where mechanical haulage is in operation up to the face and where conditions make "back-ripping" necessary.

COAL AND COKE NEWS

WASHINGTON, D. C.

It is understood that the House Democrats are being very strongly urged to place coal of all kinds upon the free list in the new revision of the tariff which is about to be taken up. The subject has been agitated for a good while and this action was urged at the time when the reciprocity bill was under consideration, but it was not possible to get from the State Department any provision for free trade in coal with Canada.

Now the suggestion is to take off the duties entirely on the ground that conditions have so radically changed as to destroy all alleged danger from foreign competition. One particular phase of the situation that is being pressed upon the politicans is the circumstance that under the proposed arrangements for selling coal in the Canal Zone, the government depots there will afford a tremnedous new demand for the American product, which will be shipped from Newport News and the terminus of the Virginian Ry. direct to the Canal Zone.

At the same time the coal shortage of the current winter and the difficulty experienced in getting an adequate supply in several parts of the country, coupled with the attempt to advance prices at a good many points which has taken an actual, although frequently veiled, form have had their effect just as they did during the coal famine in the year 1902 when Congress came very near definitely shifting coal from the dutiable to the free list.

A list of commodities is being made up by the Democrats for free-trade treatment and it is understood that this is a good deal more extensive than was the farmers' free list bill passed in the summer of 1911. Coal is one of the new items.

Petty Strikes Again

A loss to the market of 11,000 tons of coal has been caused recently by the strike of 1300 men at two Lehigh Valley Coal Co. collieries in the Pennsylvania anthracite region. In both cases the men quit work without negotiating for a settlement as provided in the agreement signed last May.

The members of the Conciliation Board, including the three labor representatives, not long ago voted in favor of a resolution condemning these strikes that are called in violation of the agreement, but interruptions are still occurring with frequency enough to reduce materially the output of coal.

At the Centralia colliery 700 men quit because of the company's requirement that three plane tenders work an hour overtime two or three days a week. The men were paid at the regular overtime rate to clean the plane after the mine closed in the afternoon, the only time when this work could be done.

The three men themselves did not object to the work, but some of their fellows protested, called a meeting of the local union Thursday, and stopped all work at the mine on Friday. The company officials learned of this decision only when the men did not start to work Friday morning.

The agreement between the mine workers and operators provides that any grievance may be taken up first with the company officials before recourse to the Conciliation Board, but in this case no notice was given even to the foreman.

The daily production at the Centralia colliery is 2000 tons, so that the strike has caused a loss of over 8000 tons.

At the Dorrance colliery, in Wilkes-Barre, where the production is 1600 tons a day, a strike of 600 men caused a loss of 3200 tons of coal. Here also the strike occurred without the attempts at peaceful settlement provided in the agreement.

PENNSYLVANIA

Anthracite

Pottsville—Snow, which fell Dec. 23 and 24, materially retarded shipments of anthracite coal. The collieries, many of them located at the bottom of steep mountains, were covered to a depth of some 12 to 15 in., greatly delaying the delivery of empty cars and the shipment of loaded ones. It is expected, however, that the situation will soon be normal again.

Wilkes-Barre—A mine fire was discovered by one of the fire bosses of the Buttonwood colliery of the Parrish Coal Co. The fire is in No. 2 East Kidney vein. Operations were suspended at noon, Dec. 16.

Hazleton—The rockmen of the Panther Creek Valley have been on strike for three weeks for a 10 per cent. wage advance. They are in the employ of contractors who are doing tunnel and other work for the Lehigh Coal & Navigation Co. This class of work does not come under the agreement signed in the spring between the coal operators and the miners.

Bituminous

Connellsville—Reports from the various trade centers are to the effect that cars are still short. In those sections where the shortage is less pronounced, the scarcity of labor is preventing operators from profiting to any great extent.

An adjustment of the wage scale of the U. S. Steel Corporation, which will result in increased earnings for its employees, has been announced. Definite statements as to the revised scale and when it will become effective, will be made later, but it is certain that an advance will be made in the near future.

Holidaysburg—James M. Dysart, formerly located in the Connellsville coke region, near Mt. Pleasant, and former general manager of the Essen Coal Co., of Pittsburgh, has presented a new Y. M. C. A. building to Holidaysburg, where he now resides.

WEST VIRGINIA

Charleston—The Kanawha Coal Operators Association has addressed a letter to the Interstate Commerce Commission, complaining about the statement accorded the Kanawha operators through the machinations of the New York Central, the Chesapeake & Ohio, and the Hocking Valley railroads, and the Sunday Creek Coal Co. interests.

Downs—Deeds for the Pittsburgh vein of coal and mining rights for about 1300 acres, located near Downs, were filed with the county clerk, Dec. 27. These deeds are made to Marcellus A. Jolliss and the total consideration is over $100,000. Although details of the deal are not to be had, it is understood that Mr. Jolliss expects later to transfer the coal to the little Kanawha Syndicate, and that the field is not to be opened until some time in the future.

Turner—The Morris Fork Coal Co. has complained to the Interstate Commerce Commission that the Coal & Coke R.R. Co., operating between Charleston and Elkins, is discriminating against it. The company charges the railroad with supplying more cars to the Davis Colliery Co., of Elkins, than to the Morris company.

Charleston—More than 4000 guns and revolvers, taken from the miners and operators in the Cabin Creek coal district, were returned to their owners, Dec. 26. Governor Glasscock has declared that he is convinced that all trouble is passed. In fact, he has granted pardons to seven of the 20 men sent to the penitentiary by the Military Commission.

Gary—Invitations have been issued for the third annual banquet of the United States Coal & Coke Co., to be held Jan. 4, for the purpose of discussing the prevention of accidents to employees.

OHIO

Columbus—A strike has been ordered by union officials at Mine No. 23 of the Hisylvania Coal Co., at Glouster, Ohio. The cause of the strike was the discharge of three men whom the superintendent claimed were careless in their work in the mine and who endangered the lives of themselves and fellow employees.

J. W. Blower, manager of the concern, upon investigation found the men working in a room with more than 750 sq.ft. of floor space without a pillar or support. The question involved is one of considerable interest to operators and miners generally as it concerns the right of the employer to discharge for carelessness. According to Mr. Blower, the company will make more money without operating at all than by being compelled to employ careless miners.

KENTUCKY

Central City—The tipple and power house of the Nelson Creek Coal Co., near Central City, Ky., burned to the ground recently, the fire being caused by a spark from the firebox. Work will begin at once on the installation of new equipment, in order that operations may be delayed as little as possible.

Henderson—Robert M. Roll has filed suit here against the People's Mining Co. for $1750, alleging breach of contract. The plaintiff claims that he resigned his position as president of the United Mine Workers of District No. 23 in order to become the manager of the defendant's mines, and that he was subsequently discharged by the president of the company without cause.

INDIANA

Washington—C. C. Martin, president of the Davies County Coal Co., has offered a reward for information that will convict the persons who attempted to blow up the boiler of the company's mine at Black Oak. The condition of the boiler was discovered just in time to prevent the entire plant from being blown up.

Fairmount—Hundreds of cords of wood will be consumed in this vicinity during the winter in the place of coal. The clearing of the Newby woods has paved the way for many to secure their winter supply of fuel at a small cost.

Richmond—In the annual report of Frank I. Pearce, state mine inspector, he states that the production of bituminous coal is increasing steadily, while the production of block coal is decreasing.

Clinton—The Indiana Railroad Commission has declined to order the Elgin, Joliet & Eastern R.R. to operate a miners' train between Clinton and the mines of the Bunsen Coal Co., six miles distant. Other trains of this character are operated in this vicinity, the miners paying $1 per month for transportation, but in this case even if this amount was doubled, the train could only be operated at a loss.

Terre Haute—The Vandalia Coal Co., the Coal Bluff Mining Co. and the Western Indiana Mining Co. have contracted with the Terre Haute, Indianapolis & Eastern Traction Co. for electric current to be used in mining operations. The furnishing of current to these and other developments, it is believed, will not only greatly increase the output, but render the mines less hazardous in every way.

Lafayette—The Railroad Commission of Indiana issued an order, Dec. 23, fixing the freight rate for coal from Linton, Brazil and Clinton District, Indiana to Lafayette, at 65c. This order will become effective Jan. 25, 1913.

IOWA

Boone—The returns from the Mine Workers election, District No. 13, although incomplete, show that W. H. Rodgers, of Albia, has been reëlected president for the coming year. Sam Ballantyne, of Boone, has been elected vice-president. Mr. Rodgers is quite popular with the miners of this community and has proved an efficient official in the service of the union. It is said that he ran far ahead of the other two contestants for the office.

ILLINOIS

Georgetown—There seems to be little doubt that the Bunson Coal Co. has contracted for the John F. Ashby farm, northwest of this city, and also for a portion of the farm adjoining. The purchase of this farm gives rise to the belief that it is to be used for the sinking of a new shaft at an early date.

Taylorville—The Taylor interests, of St. Louis, are preparing to take 1500 acres of coal rights in May Township, in addition to the 11,000 acres recently taken in Taylorville, Buckhart and Stonington Townships.

Springfield—A New York syndicate has purchased 30,000 acres of coal rights in Macoupin County, for $600,000, and taken an option on 280,000 acres additional, paying, therefor, $24 an acre in Montgomery, Saline, Perry, Madison and Jefferson Counties. The syndicate will sink four mines in the 30,000-acre tract.

Pekin—The Tazewell coal mine has been destroyed by fire, which is thought to have been started by particular enemies of the company.

Belleville—On Dec. 19 the Supreme Court of Illinois affirmed a ruling of Judge Bernreuter and awarded damages against a railroad company for failure to supply sufficient cars for the transportation of coal. The suit was brought by the Mulberry Hill Coal Co. against the Illinois Central R.R. Other suits of a similar character are pending.

FOREIGN NEWS

Tokyo, Japan—Over 200 Japanese coal miners are entombed and probably dead as a result of an explosion which occurred in the Ubari colliery, at Sappero, on the Island of Hokkaido, Dec. 23.

Quebec, Canada—Fire completely destroyed the coal sheds of the Nova Scotia Steel & Coal Co., on the Louise Embankment, Dec. 12. The loss is in the neighborhood of $20,000.

Cardiff, Wales—The report that 100,000 tons of American coal is being purchased by the Egyptian railroads in place of the customary Welsh supply has caused quite a sensation here.

PERSONALS

Coal men and traffic officials generally are urging the appointment of Howard Manington, formerly secretary of the Ohio Coal Operators' Association, as a member of the Ohio Public Utilities Commission.

President J. M. Fitzgerald, of the Davis Coal & Coke Co., has announced the appointment of Newell W. Roberts as assistant to the chief executive of the company. Mr. Roberts was formerly connected with the Durham Coal & Iron Co.

Joe Smith has resigned as general superintendent of the Stag Cañon Fuel Co. and leaves for Trinidad on Jan. 1 to devote his attention to his coal property there. The position will be filled by William McDermott, who has been connected with the Victor-American Fuel Co. for a number of years.

F. J. Durdan, of Pittsburgh, has been appointed Kentucky sales agent of the Monongahela River Consolidated Coal & Coke Co., succeeding Charles H. Bohmer, whose resignation takes effect Jan. 1. Mr. Durdan has been associated with the company for about a year, and was formerly sales agent of the Buffalo & Cleveland Coal Co.

OBITUARY

Martin McLaughlin, state mine inspector, at Shamokin, Penn., died in that city after a brief lilness. He was prominent in Democratic politics in Northumberland County.

The funeral of A. W. Carlson a prominent coal dealer, of East Des Moines, was held at his home, Dec. 15. Mr. Carlson organized the Maple Grove Coal Co., the Maple Block Coal Co., and another enterprise known as the Delaware Coal Co. At the time of his death he was president of the High Bridge Coal Co., at High Bridge, and also of the Zimbelman Coal Co., at Boone.

CONSTRUCTION NEWS

Sartell, Minn.—The projected erection of a coal tower and water tank at Sartell has at last become a reality. Material is now being hauled to the location and work will be started soon.

Pottsville, Penn.—Work on the new Girard mammoth colliery, Raven Run, which is being rebuilt on the site of the old breaker destroyed by fire several months ago, is being pushed rapidly.

Beaverdale, Penn.—It was announced here, Dec. 20, that the large tipple owned by the Pennsylvania Coal & Coke Corporation, which was damaged by fire several evenings ago, would be rebuilt.

Osceola, Mo.—C. R. Hunt and associates plan to construct a hydro-electric plant on the Osage River, including a 14-ft. dam of reinforced concrete, to develop 4000 hp., at an estimated cost of $600,000.

Connellsville, Penn.—The National Consolidated Coal Co. will develop a large tract of coal in Barbour County, W. Va. It is proposed to erect coke ovens and enter that trade as well as the selling of coal.

Hendersonville, N. C.—Manufacturers Power Co., of Hen-

dersonville, N. C., is reported as planning to construct a dam, power house and transmission system, etc., on Green River, between Hendersonville and Saluda.

Cedar Rapids, Iowa—Among the notable improvements of the year are those of the Hawkeye Lumber & Coal Co. now nearing completion. The plant of this company has been thoroughly modernized at a cost of several thousand dollars. The yards and general surroundings have been greatly improved.

Reynoldsville, Penn.—The McConnell Coal Co., which is composed chiefly of Reynoldsville, Brockwayville and Beechwoods people, is making rapid headway at its operations above Brockwayville. Two hundred acres of land have been leased for a long term of years. Work on the tipples and the drifts has been going on for several days.

Mount Sterling, Ky.—The Kentucky Utility Co. plans extensive improvements to its electric light, power, railway, water and gas system, at Mt. Sterling, Winchester, Shelbyville, Versailles, Somerset and Elizabethtown, Ky., and is reported as expecting to build a $100,000 electric plant at Winchester, and a $75,000 plant at Somerset.

Luzerne, Penn.—Last week the new East Boston breaker, which replaces the one recently burned down, was put in operation. It is of steel and concrete construction, and unlike the old breaker, which was built directly over the shaft, this is erected several hundred feet distant from the shaft opening or mouth, to conform with the mine laws now in force.

Smith's Ferry, Penn.—The East Liverpool Traction & Light Co., and the Ohio Valley Scenic Route Ry. Co. expect to spend $2,000,000 in the construction of a big power plant, one mile north of here on Beaver Creek, at the Island Run Mines. The traction interests have leased or bought over 2000 acres of coal land in Beaver County, near the site of the coal plant.

Muscatine, Iowa—The Graving Coal Bin Co., of Chicago, has just completed its automatic coal-handling plant at a cost of $30,000. The plant is 450 ft. long, 40 ft. wide and 55 ft. high. More than ½ million feet of lumber were used, together with 1000 bbl. of concrete. Barely 3 min. are required now to load a 4-ton wagon; while, before, it required fully fifteen.

Toledo, Ohio—Final details of a contract whereby the C. W. Mooney coal lease of 25,000 acres, in Belmont and Monroe Counties, Ohio, involving nearly $5,000,000 are said to have been closed. The Captina Development Co., composed largely of Toledo capital, is the purchaser. It is said that a railroad switch to the old Correll mine, at Big Run, and a new steel tipple will be built there.

Jenkins, Ky.—Authentic information indicates that the Baltimore & Ohio Ry. Co. is planning to build a bridge across the Ohio River, at Huntington, as a part of a new line which will be built from Jenkins, Ky., to Jackson, Ohio, to connect with the main line.

If present plans are carried out eight operations will be conducted on the Jenkins side of the mountain and six on the McArthur side. It is thought that the traffic over the new road will be heavy and the Baltimore officials are pleased with the prospects.

Cowansburg, Penn.—The development of the coal lands between Yukon and Cowansburg after many years is a realty. The Pennsylvania R.R. Co. has begun work on the extension of the Yukon branch from its western terminus at Bell's Mills to Cowansburg, on the Yough branch. The railroad will follow the big Sewickley Creek and about seven miles of new roadway will be built. McMann & Simms, of Philadelphia, Penn., are the contractors. This coal is nearly all the property of the Manor Realty Co., of Philadelphia. It will be developed in due time.

NEW INCORPORATIONS

Winston-Salem, N. C.—The Carolina Coal & Ice Co. has been incorporated with a capital stock of $125,000.

Cincinnati, Ohio—Cliff Coal Co., Portsmouth, Ohio, has increased its capitalization from $30,000 to $40,000.

Detroit, Mich.—The Durmond Coal & Cartage Co.; $2500. Ernest I. and Ethel M. Durmond and Levi Anderson, incorporators.

Reading, Penn.—American Fuel Co.; capital, $100,000. Incorporators: T. F. Magarity, B. P. Ocheltree, M. B. F. Hawkja, Wilmington, Del.

Kansas City, Mo.—The V. McDaniel Fuel Co. has been incorporated with a capital of $4000. The incorporators are Virgil McDaniel, G. L. Stauffer and Charles Hayward.

Brooklyn, N. Y.—Greason, Son & Dalzell, Inc., deal in and transport coal of all kinds; capital, $100,000. Incorporators, J. Greason, J. L. Greason, E. T. Dalzell, Brooklyn, N. Y.

St. Louis, Mo.—The Ratican Coal & Contracting Co. has been incorporated here with a capital of $10,000, the incorporators being I. C. Muckermann, Wm. Ratican, and Peter J. Ratican.

Hillboro, Ill.—The Fayette County Coal Co. has been organized. A. J. Williford, of Nokomis, is treasurer of the company; $300,000 will be paid out immediately for 32,000 acres of coal land.

Ottawa, Ont.—Letters patent have been granted incorporating the London Land & Coal Co., of London, Ont.; capital, $2,000,000, to operate mineral and other lands and to search for coal and petroleum.

Clearfield, Penn.—Application will be made Jan. 14, by J. Boynton Nevling, Reuben F. Nevling, and Samuel E. McLarren, for the charter of an intended corporation to be called the Nevling Coal Mining Co.

Waukegan, Ill.—The Waukegan Coal Co. has been incorporated with a capital of $35,000 to deal in lumber, coal and building materials. The incorporators are Thomas McGay, W. O. McKinney, Alexander Whan, David U. Hart and J. D. Pope.

Lexington, Ky.—The Kypadel Coal & Lumber Co. recently organized with a capital of $500,000, for the purpose of acquiring coal and timber lands, has secured some 35,000 acres of land in Eastern Kentucky. No immediate development is contemplated, however.

Dover, Del.—Articles of incorporation have been filed for the Buffalo Creek, Coal & Brick Co., of Pittsburgh, Penn., to purchase, lease, hold, own, control and deal in coal and other mineral land. The capital stock is $250,000. Incorporators, Childs A. Smith, of Pittsburgh; R. D. Duranter, of McDonald, Penn.; C. E. Meyer, of Ingham, Penn.

Wheeling, W. Va.—The West Virginia Gascoloil Co., of Huntington, W. Va., has been incorporated to drill for oil or gas, mine coal, acquire mineral or timber lands, and develop them. Capital, $200,000. Incorporators, A. B. Brode, H. G. Bowles, and Frank W. Irvin, of Huntington; May B. Hess and H. H. Baker, of Hamlin, W. Va.

INDUSTRIAL NEWS

Lisbon, Ohio—Work at the new mine of the Card & Prosser Coal Co. on the old Hanna farm, near Teegarden, is now fairly under way.

Whitesburg, Ky.—The Consolidation Coal Co. is shipping from 30 to 40 cars a day out from McRoberts, consigned to the Northwest.

Scranton, Penn.—The Bittenbender Co. announces that it has just issued a complete catalog covering mine, mill, railroad and contractors' supplies.

Missoula, Mont.—O. O. Dutcher has discovered a vein of coal in Boise County which is reported to be exceptionally good and he is making arrangements to place the coal on the market.

Connellsville, Penn.—L. S. Mellinger and J. S. Bryner are busy having options on Indian Creek valley coal lands assigned to them, preparatory to turning them over to new purchasers.

Uniontown, Penn.—The big purchase of Mrs. Sarah B. Cochran, of Freeport coal in lower Tyrone township, will be developed at once. Her nephew, Frank A. Farr, is superintending the work.

Marion, Penn.—The Hillsdale Coal & Coke Co., one of Clark Brothers' interests, has opened up new mines on Horton Run, not far from Horton. The plant will be operated by electric power from the plant at Glen Campbell.

Wilkes-Barre, Penn.—Madeira, Hill & Co. have commenced transporting coal over the Lehigh Valley R.R., from their Pond Creek openings to their Harleigh breaker, a distance of about 11 miles, for preparation and shipment.

St. Louis, Mo.—The Merchants Ice & Fuel Co. has obtained a permit to build a branch office and coal and ice depot at the northeast corner of Hodiamont and Bartmer Aves. The estimated cost of the improvement is $28,000.

Manitou, Ky.—Bernheim Bros., of Louisville, who own what is known as the Bailey coal field, near Manitou, are reported to have made a deal in which they purchased adjacent properties to the amount of about 200 acres. The price is not announced.

Madisonville, Ky.—It is reported here that the large block of coal properties in what is known as the Beulah coal field is to be transferred under an existing option or an extension thereof, as titles have been examined and the deal practically agreed upon.

Johnstown, Penn.—Louis J. Bradley, of Williamsport, has been in Johnstown for the past ten days conducting negotiations for coal land, and it is rumored he has secured control of a large acreage in Westmoreland County, and will start operating in the near future.

Coshocton, Ohio—Workmen, excavating for a barn on the Edward and R. R. Hanlon farm, have uncovered what is believed to be the richest vein of coal in this county. The owners of the land plan to lease it to coal operators, thus opening up an entirely new Ohio field.

Sunbury, Penn.—The season recently closed has not been a record one, owing to the fact that the water conditions were not at the best during much of the time. Thousands of tons of coal were secured, however, and there was a ready sale for all that could be mined.

Greensburg, Penn.—Over 1000 acres of Freeport coal located in Ligonier Township, near the Four Mile Run, has been sold by the farmers of that section to Franklin Byers, of Mt. Pleasant. This purchase, which is the first of the Freeport vein sold in this section, may develop this coal field.

Wilkes-Barre, Penn.—The Lehigh Valley Coal Co. is erecting a large new breaker at its Franklin Colliery in Wilkes-Barre East, which is one of the first, if not the first, colliery owned by it. It will be modern in every respect, and is estimated to cost about $200,000, or more, when completed.

Monongahela, Penn.—It has been learned that the Mongah mine of the River Coal Co., which has been shut down for the past 18 months, is to be opened up shortly after the first of the year. This mine employs over 400 men. It will be fitted out with new equipment which will cost in the neighborhood of $50,000.

Philadelphia, Penn.—The Penn. R.R. Co. is buying or condemning by right of eminent domain, a strip of land along its tracks for a considerable distance on the Sunbury Division, mainly in Conyngham Township (including some leased by the West End Coal Co.) for additional trackage and improvements. It has long needed these for its increasing trade.

Clarksburg, W. Va.—An important coal deal which has been pending for some time has just been closed, whereby Vincent E. Gocke, president of the Daniel Coal Co., has acquired from the Calvert Coal & Coke Co., of Chicago, their Byron and Robey plants. No possession will be taken of the plants until Jan. 1. The consideration is private.

Hazard, Ky.—The Buffalo Creek Coal Co. has secured the C. G. Bowman tract of 2000 acres in Perry County, near Hazard, the consideration being about $75,000. The company has made arrangements for the immediate installation of equipment for mining operations, and also plans to put in saw and planing mills for the utilization of the timber on its properties.

Whitesburg, Ky.—Philadelphia and Baltimore interests recently acquired fifty acres of coal land in the Shelby Creek section, above Whitesburg, Ky., adjoining other properties owned by the same parties, at a price of a little over $7500 cash, which is said to be the highest price ever paid for land in that section. The purchasers are said to be preparing to develop their properties.

Baltimore, Md.—The Alabama Consolidated Coal & Iron Co.'s stockholders' committee has announced details of the plan it has drafted for rehabilitation of the property. It provides for an assessment of $30 a share against the preferred stockholders and $15 a share against the holders of the common stock. This would furnish a total of $750,000, divided equally between the two classes of stock.

Scottdale, Penn.—Hon. John R. Byrne and his brothers became the owners of the Mathias tract of coal, which lies in Sewickley Township, and is a part of the Yukon coal and coke development. The Byrne interests will at once begin the building of a 60-oven coke plant, it is said, and will also commence on tipple, tracks, and other improvements, it being their intention to ship coal as well as manufacture coke.

Lincoln, Ill.—The options given the Peabody interests on the coal mines in Sangamon County have expired and Mr. Peabody has been in Springfield to listen to reports of experts he has had investigating local conditions for him. Should these reports be satisfactory, Mr. Peabody was expected to have taken up the options. He has assured the Springfield people that a merger will not mean a closing down of the mines.

Ashland, Ky.—The Sara Furnace, the Martiny Iron & Steel Co., and the Ironton Iron Co., at Ashland, Ky., have been compelled to shut down owing to a lack of coke, which in turn was a direct result of the car shortage. The expected operation of the big new plant of the Kentucky Solvay Coke Co., will relieve the situation, as it will turn out enough coke to supply the local demand, as well as considerable tonnage for the outside market.

Freeland, Penn.—Dump cars and a steam shovel are on the ground and operations have been begun on the new stripping at the east end spur of the Buck Mountain vein, Drifton No. 2 colliery, of Coxe Bros. & Co., Inc., in the Lehigh region. The vein of coal is said to be about 15 ft. in thickness, lies near the surface, and is believed to crop out near the southern boundary line of the borough. It will be transported by locomotive to and prepared at No. 2 breaker of this firm.

Chicago, Ill.—The Roberts & Schaefer Co. has just been awarded a contract by the Queen & Crescent Route for two 500-ton capacity, fireproof, main-line, reinforced-concrete, Holmen coaling stations, electrically driven, for installation at Danville, Ky., and Oakdale, Tenn. Price, $37,000. These plants are to be exact duplicates of two former plants of this character of construction that this firm erected for the Queen & Crescent at Montlake, Tenn., and Ludlow, Ky.

Kingston, Penn.—Near Sugar Notch, the Pittston Coal Co. is demolishing the old breaker and building a new one of increased capacity, to cost about $30,000. The old breaker was dynamited at some parts to facilitate its removal. The concrete walls for the new are already in place, heavy lumber is on the ground and being framed, and the work is being pushed with all possible dispatch by the contractors, Messrs. Reilly & Co., of Kingston. It will scarcely be completed, however, before late next spring.

North Bend, Ore.—A new coal mine is being opened by C. A. Smith, of North Bend, and his business associates, and when in operation will be the largest coal mine in the county. Only 25 tons per day are taken out at present, but when the shaft is sunk deeper and the mine is in full operation, the output will be upward of 200 tons per day. A private railroad is used to transport the coal to deep water, where it is dumped into bunkers and stored till sold. There are about 1,000,000 tons of coal above water level at this mine.

Birmingham, Ala.—Walter Moore announces that the Panama Coal Co. will spend approximately one million dollars in the development of 35,000 acres of Black Creek coal land. Included in this development is the building of several miles of railroad for the purpose of connecting the property with the Frisco R.R., also modern equipment suited for working the Black Creek seam. It is expected that the company will be able to mine a minimum of 2000 tons of coal daily shortly after completion of the railroad spur to the mines. An average of 18 analyses of this Black Creek coal showed less than 2 per cent. ash and 15,629 B.t.u. per lb. It is equal in quality to the very best coals.

Barbourville, Ky.—Besides the Wallsend plant of the Continental Coal Corporation, near Barbourville, several other coke ovens have recently begun operations in eastern Kentucky, and turn out a product which is said to be the equal of any on the market. The Wisconsin Steel Co. is operating the largest battery of coke ovens in that region at Benham, and with a million-dollar installation turns out coke for the use of the company's northern plants, which are owned by the International Harvester Co. Ovens are also in operation in Pike County, Elkhorn district, and elsewhere in the field, and the industry bids fair to attain large proportions during the coming year.

Portland, Ore.—Much improvement is being made at the Libby mine, which is leased by George Doll. A new vein is being opened, which will greatly increase the production. The town of Libby, where the mine is situated, and which for several years was deserted, when the mine was closed down, is now quite lively.

The Beaver Hill mine, owned by the Southern Pacific interests, is undergoing some extensive development work. A new shaft is being sunk that will cost $300,000. Coal from this mine has become widely known in Portland, and is good coal for general use. The Southern Pacific owns its own coal ships and makes considerable money from the operation of this mine.

Marshfield, Ore.—The Millicoma mine on Coos Bay has been leased from the chief owner, J. A. Ward, by Portland capitalists and will be operated at once. E. H. Morgan, who examined the mine for the Portland men several months ago, will be the superintendent, and will take charge of the property at once. Mr. Ward expects to be connected with the operating company. The mine property takes in about 400 acres of land, and it is in such shape that coal in marketable quantities can be taken out at once.

COAL TRADE REVIEWS

GENERAL REVIEW

Additional stress has appeared in the anthracite market, due to the holiday suspension in the mining regions. Retailers continue short and the public is disregarding preferences in sizes and taking what can be obtained. Renewed interest is being shown in the premium coal out of New York and, while prices remain unchanged, a great deal depends on the weather. The trade has to depend on current production, which is far from sufficient to supply the demand. In some respects, however, the situation is easing off. There does not seem to be the pressure there was for egg, but pea, stove and chestnut are still quite short, and dealers can make no promises about deliveries.

In the Middle West the larger sizes appear to be getting more plentiful, and there are some cancellations, due to the milder weather, but premiums are still being well maintained. Consumers were well stocked in anticipation of a hard winter, and the trade is only about normal. In the South, the situation appears more acute; the demand continues active, and supplies are quite short.

In the coastwise bituminous trade, the last of the year developed more buying and in a larger volume. There are only small arrivals, all-rail, quantities available are scattering, and few operators can guarantee prompt shipment. Prices have reached the highest point since the depressed condition in effect during the summer and show every evidence of advancing still further. The receipts at the piers are small, and supplies generally, far short of the demand.

The appearance of real winter weather, together with a shortage, has developed an unusually strong market generally in the East. The situation could, however, hardly be otherwise in the face of these conditions; if the producers had an adequate supply of both labor and cars, they would doubtless flood the market with coal. The situation will, of course, ease off when the production does increase, but the trade generally is of the opinion that there will be no material decrease in consumption and that the high prices will hold. In the Pittsburgh district, the market has been quiet, and production relatively light due to the holiday suspension. The domestic demand has been fair, but the manufacturing quite light. In spite of the suspension over the holidays, there has still been considerable activity in Ohio. The steam business continues strong, consumers stocking against an emergency and the colder weather has brought an increased domestic demand. Prices on slack are particularly firm and some contracting is being done at a slight advance over last year's business.

Considerable surprise was occasioned at Hampton Roads, when the new circular for 1913 was announced, showing an advance of 30c. a ton over the old figures. West Virginia coals are gaining rapidly in favor for bunkering purposes, and the operators felt justified in making this increase. Railroads in the Kentucky field have apparently about satisfied their requirements, and are now taking little coal; domestic has been declining for some time, and appears to be on the verge of a break. In the Southern markets the usual holiday dullness prevails and not much buying is expected for the present; operators in this district made a special effort to lose as little time as possible over the holiday period, because of the prevailing high prices.

There has been a temporary set-back in the Middle-western market because of the holidays, but prices, as a rule, remain steady. The expected cold wave about Christmas did not materialize, and domestic is rather dull, but dealers believe that this will only be of short duration. Considerable buying has been put off until after the first of the year, and, when this appears, it will materially strengthen the market.

BOSTON, MASS.

Another small spurt has come in bituminous. The last of 1912 developed more buying, and in a larger volume. On the other hand, receipts at the loading piers are materially reduced by the holiday suspension, and prices are up at least 20 to 25c. from a week ago. This is especially true at New York, and Philadelphia shares it to a limited extent. At Hampton Roads and Baltimore there are as yet few sales of spot coal. The larger agencies are committed to loading vessels on contracts that are still effective, and the detention is only slightly improved. Of late years a large tonnage for New England has been loaded from Baltimore, and the excessive delays there, due to car shortage on the B. & O., make a serious upset in the calculations of those depending on supplies from that quarter. The quantity of coal available at other points is scattering, and values are almost sure to be higher in the next fortnight.

All-rail there is only a small movement of bituminous; $2@2.15 at the mine is the current price for fair grades from the Clearfield region. It is only the exceptional operator who can guarantee prompt service, and there is less heard about coal offering at the junction points for New England routing. The Christmas snowstorm was confined to the seaboard for the most part and apparently did not affect rail shipments, except to increase the anxiety of consumers who are running on small reserve stocks.

Hard weather on the coast has seriously interfered with arrivals. The retail dealers continue on the ragged edge for the popular sizes, and there is nothing new to report. A great deal depends on January weather; if it turns cold for a fortnight or so at a time, there will be real distress for fuel. As things have been, the public has shown a willingness to disregard preferences and get along on what sizes of anthracite could be had. There is renewed interest in premium coal at wholesale out of New York, although prices are not materially changed.

Present wholesale quotations are about as follows:

Clearfields, f.o.b. mine	$2.00 @ 2.15
Clearfields, f.o.b. Philadelphia	3.[illegible] @ 3.40
Clearfields, f.o.b. New York	3.55 @ 3.70
Cambrias, etc., f.o.b. mine	2.15 @ 2.25
Cambrias, etc., f.o.b. Philadelphia	3.40 @ 3.60
Pocahontas New River, f.o.b. Hampton Roads	3.50 @ 3.60
Pocahontas New River, on cars Providence	4.50
Pocahontas New River, on cars Boston	4.75

NEW YORK

Anthracite—The effects of the heavy snow storm, on Tuesday of last week, have been discounted and the hard-coal trade is again back on about the same basis it was immediately preceding this. This abrupt change in weather conditions, threatened for a time, to effect a radical change in the hard-coal market and conditions during the remainder of that week were quite uncertain and rather tense. It was believed by many that the trade would prove very susceptible to this first, and rather alarming appearance, of real winter and the result was that shippers were inclined to hold all consignments available and free tonnages became quite scarce all along the line.

The tense feeling, however, has been gradually easing off since that time and is now back to approximately the same conditions in effect before. The demand has been slowing up and the situation getting easier all along the line, particularly on egg coal, the premiums on which are quite materially off; there is also little demand for chestnut. The consumption appears to be about normal and it is improbable that large premiums will again be paid in this market during the remainder of the season.

Production is quite good and it is doubtful if any large losses will be sustained as a result of the holiday suspension. These stoppages at the mines has enabled the railroads to keep the operators supplied with all the equipment they could load, which was not the case previous to this. It is probable, therefore, that the loss of time, due to the holidays, was only about the equal that which would have been sustained in any event, because of the insufficiency of cars at the mines.

We quote the New York anthracite market on the following basis, with prices generally firm in all departments:

	Upper Ports	Lower Ports
Broken	$5.00	$5.00
Egg	5.25@6.00	5.20@5.60
Stove	5.25@6.50	5.20@6.30
Chestnut	5.[illegible]@6.50	5.45@6.30
Pea	3.50	3.45@4.25
Buckwheat	1.75	2.35@2.70
Rice	2.25	1.70@1.95
Barley	1.75	1.25@1.70

Bituminous—The soft-coal situation is badly mixed up at the present time, there not being much coal available while the demand is spotty and intermittent, and confined mostly to small tonnages. There are fairly good supplies coming

in, but on the whole shipments are light. The line trade is the best feature of the business, the situation at tide being rather weak. The requirements of the trade are naturally reduced as a result of the holiday suspension in general manufacturing, but the production at the mine has likewise decreased for the same reson, and thus conditions in this respect are practically unchanged.

At the present moment it is practically a weather market. A general decline in the temperature will doubtless bring with it a jump in prices, while on the other hand, if the weather remains mild, the market will continue soft and unsteady; the car and labor supply are also important considerations that may assume serious proportions at any time.

Production in the mining regions has been quite poor. The car supply in West Virginia has been entirely inadequate, even with the curtailed work at the mines over the holidays. In Pennsylvania, however, the roads seem to have been able to keep the mines well supplied with cars. The shortage of labor in this latter district, however, is assuming serious proportions and promises to become quite acute should there be a heavy production.

New York bituminous prices are as follows:

West Virginia, steam	$3.15@3.25
Ordinary grades, Pennsylvania	3.15@3.25
Fair grades, Pennsylvania	3.15@3.25
Good grades, Pennsylvania	3.20@3.30
Best Miller, Pennsylvania	3.30@3.40
Georges Creek	3.50

PHILADELPHIA, PENN.

The inclement weather of early in the week caused additional calls on the dealers, and they are more than insistent in their desire to secure supplies of anthracite coal. Conditions are not in any way improved as to the output, for after a week of holidays, with curtailed production, certain sizes are in as short, if not shorter supply, than has been the case so far this winter. Stove and pea coal are simply impossible to obtain in sufficient quantities, and all the dealers are complaining bitterly, but it is a fact nevertheless, that the trade in this vicinity is being taken care of to the best of the ability of the companies forwarding coal to this market.

The large operators and some of the small ones, have been handicapped by lack of men, petty strikes and inadequate car supply. Large quantities of coal are coming to this market, but the demand is so heavy, and everyone so insistent, that when spread around, no one is satisfied. Egg coal seems to be in easier supply than any of the other domestic sizes, but chestnut still maintains its place as a scarce article. With two months of what is likely to be severe winter weather, the situation looks anything but promising, and a heavy snowstorm or blizzard would be likely to cause considerable discomfort, if not actual famine, if the operations of the railroads were held up for any considerable length of time.

Bituminous prices have reached what is considered the high-water mark in quotations since conditions became better the middle or latter part of the summer. Prices are anywhere from 10 to 15c. per ton over quotations of the previous week, and the supply is far short of the demand at the present time, due in a large measure to the holidays, added to insufficient car supply. As a matter of fact, the advance in prices is doubtless due to the scarcity of coal, rather than any extraordinary demand.

BUFFALO, N. Y.

The bituminous market is strong and could hardly be otherwise, so long as the car supply is so short. No doubt if the operators could have their way they would soon flood the market, no matter how great the demand might be, but as it is they are handicapped and it looks as if they would remain so for some time. The car shortage is quite as great as it has been at any time.

That there is no letting up of the stringency is shown by the report of one of the large city jobbers, that he was notified by the railroad that if he would load with fuel for the road a supply of cars would be given him next day. Of course, there was nothing to do but comply, regardless of the fact that there were plenty of customers waiting for coal.

The holiday time is not a very good one for sizing up the market, for the miners are idle a great part of the time, so that even if the factories are shut down also, it is likely that the decreased output is more than the decreased consumption. What the operator is trying to do is to evade the drawbacks and put a full capacity supply on the market in spite of everything. There is comparatively a big margin of profit in the business now and to do that would mean a large measure of success. For all the bad places in the bituminous trade, however, the general tone is very much better than it was a year ago. It is the policy of business not to be satisfied, but there are many grades of dissatisfaction for all that.

The quotations are as strong as ever. Some markets seem to find a weakness in the trade, but anything of the sort here is denied. One active jobber of bituminous and independent anthracite reports that, for the first time in many months, he has not a single car in this vicinity subject to reconsignment. The Pittsburgh figures remain at $3 for select lump, $2.85 for three-quarters, $2.75 for mine-run and $2.50 for slack. Coke is hardly as strong as formerly, the prices appearing to have reached the top. It is still proper, however, to quote best Connellsville foundry at $6.50.

There have been a few cancelations of anthracite orders on account of the weather, but a jobber is still able to report sales of independent hard coal at $1.50 premium; the average excess is about $1.25, as last week. There is just now, very little anthracite coming this way from the mines, and prices are expected to remain pretty strong till mining is more active. Large sizes of anthracite are more plenty, and small grades shorter.

PITTSBURGH, PENN.

Bituminous—The coal market has been quiet the past week, and production has been relatively light, due to the interruption of the holiday. There has been a fair demand for domestic coal, but very little from manufacturing consumers, either for prompt or contract. Circular prices continue to be quoted as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.55, per ton at mine, Pittsburgh district.

Connellsville Coke—Consumers of furnace coke were so well provided with stocks that last week's light shipments, on account of the holidays, had only a moderate effect upon the market. Prompt furnace coke sold up to $4.25, when $4 had been about the highest previously obtained. Contract business has been light, consumers objecting to paying the high prices asked, and believing the present to be an inopportune time to contract, when prompt coke is particularly scarce. It is reported that one contract has been made within the past few days for 12,000 tons a month over the first half at $3.50. We quote: Prompt furnace, $4.15@4.25; contract furnace, first half, $3.25@3.50; contract furnace, year, $3@3.25; prompt foundry, $4.25@4.75; contract foundry, $3.24@3.75, per ton at ovens.

BALTIMORE, MD.

Real winter weather conditions and a limited supply of coal were the dominating factors in the exceptionally strong market which prevailed here during the past week. The day before Christmas, this section experienced the first touch of cold weather for weeks, which was accompanied by a 3-in. snow, and such conditions have figured largely in the movement of fuel from the mines to tide water. Added to this was the expected shortage, resulting from the holiday period, in the West Virginia and other regions. One of the large local operators stated that the output from the mines of his company was considerably reduced on Tuesday. Wednesday, the mines were closed down altogether, and not more than half the miners normally employed, put in an appearance on Thursday, thus reducing the week's output of fuel to three whole days. This was the experience of practically all of the local companies.

Under such conditions, the market was naturally strong, and prices of all grades advanced from 10c. to 20c. over those of the previous week. There were rumors that one operator received $2 for low-grade coal the latter part of the week from consumers, whose stocks had run low, and who were eager for coal at any price. This was the highest price recorded during the week, but the last three days spot coal brought $1.75 and $1.80, and there were at least a half dozen customers for every ton offered.

The coal tonnage of the Consolidation Coal Co. for the year to Dec. 24 was 10,200,000 tons as compared with 9,075,000 tons for the corresponding period of last year, an increase of 1,125,000.

COLUMBUS, OHIO

While the past week has been broken by the Christmas holiday, still it has been one of considerable activity in the coal trade. Colder temperature has caused a better domestic demand and accordingly orders from retailers in Ohio, Indiana and Michigan have been more urgent. On the whole, the trade is satisfactory, when the condition of the car supply is taken into consideration and operators look for more activity in the near future.

Prices are remaining firm at the figures which have been prevailing since Dec. 1. Reports show a little softness in the Chicago market, but this condition has not affected the Hocking trade to any appreciable extent. Dealers in all sections

are fairly well stocked with domestic sizes, although in some localities stocks have run down rather low.

Steam business is still one of the strong points of the trade and there is a good demand from all lines of manufacturing. Some of the larger plants have been attempting to stock up to guard against an emergency, but they have not succeeded to any great extent because of the car supply. Concerns engaged in the iron and steel industries have been especially large purchasers of steam sizes. Some contracts expire about this time and renewals are being made, in some cases at slightly higher figures than prevailed during the previous year. There is still a good demand for railroad fuel and this branch of the trade is gaining in importance.

Production in all fields has naturally been curtailed by the shortage in cars, although it has also been affected by the Christmas holidays. In the Hocking Valley proper, the production is probably larger than in other sections in the state.

Retail trade has been rather inactive under the influence of the mild weather. Most of the larger householders have purchased their winter's supply, although there was a rush of small orders recently. Retail prices are practically unchanged.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburg	Pomeroy	Kanawha
Domestic lump	$2.00	.....	$2.25	$2.00
2-inch	1.80	$1.50	2.00	1.65
Nut	1.50	.....	2.00	.....
Mine-run	1.50	1.40	1.50	1.50
Nut, pea and slack	1.15	.....	1.25	0.90
Coarse slack	1.00	1.15	1.10	0.75

CLEVELAND, OHIO

Prices fell off considerably on coarse coal in the vicinity of Cleveland during the past week. This break, no doubt, is due to the fact that the companies in the Pittsburgh No. 8 field have been forced to operate their mines exclusively on rail shipments during December; approximately 40% of this product was shipped via the Lakes during the summer months. The sudden placing of this tonnage in the rail market after the Lake season had a tendency to reduce coarse-coal prices.

During the early part of December operators were quoting $1.20 on Pittsburgh No. 8 run-of-mine for spot shipment and $1.10 for contract. This price has reduced considerably and consumers are now purchasing run-of-mine as low as $1.10 for spot shipment.

Slack is still the ruling factor. One 50- and one 100-car order was closed during the past week on Pittsburgh No. 8 slack at $1.20, the mines. On account of the high price of this grade, practically all of the mines are screening ¾-in. lump coal on run-of-mine orders. Slack is averaging 10c. per ton higher than run-of-mine.

The following prices per net ton f.o.b. the mines are quoted on the various coals for immediate shipment.

District.	¾-in.	Mine-run	Slack
Youghiogheny	$1.40	$1.30	$1.10
Pittsburgh No. 8	1.20	1.10	1.20
Goshen No. 6	1.45	1.35	1.25
Coshocton	1.75	1.50	1.25

The production of coal between Christmas and New Years was reduced 50% on account of holiday celebrations. Mines continue to report a scarcity of railroad equipment. These conditions are bound to increase prices after the first of the year.

LOUISVILLE, KY.

The car situation has been affected by the holiday lay-off, which the eastern Kentucky miners, in particular, are taking this year as usual, despite short work during the fall. This enforced idleness at the mines is permitting cars to accumulate. It is reported that the Southeastern railroads, however, are in serious straits for coal, as initial lines have been absorbing all the fuel available. When the Louisville & Nashville and the Atlantic Coast Line, for example, have been facing a lack of fuel which made a curtailment of operations imminent, it is obvious that roads less favorably situated, with reference to the mines, must be rather badly off.

As a natural result of this condition, run-of-mine has sold, during the present week, as high as $1.75, and nut and slack has run up to $1.25, although all sorts of prices, down to 65c. have been heard. While lump is quoted at from $2.25@2.40, this is still a good deal under the high figures of November, when the car shortage was at its worst.

HAMPTON ROADS, VA.

Although interrupted by the Christmas holiday, the dumping at Hampton Roads during the past week was heavier than at any time in the past month and a half. All shippers appear anxious to clean up what old obligations are remaining, during the last few days of the old year. While the month's dumping figures are not yet available, indications point to a larger tonnage put over the local piers than during November.

During the past week, prices on bunker coal at Hampton Roads for the year 1913, were announced. Considerable surprise was expressed when it was learned that it would be advanced 30c. per ton. On the other hand, it has developed recently that good steamship coal could be purchased here for much less than at other points, and steamers were going out of their way in order to take advantage of the cheap supplies here. It is probable for this reason that the export shipments from here will soon show a rapid increase.

MEMPHIS, TENN.

Notwithstanding this territory is having one of the most open winters in its history, there is quite a scarcity of coal because the car situation has been bad for the past 60 to 90 days. The miners are having a prolonged vacation during the holidays, and it is making coal just a bit more scarce than it has been this winter.

The car situation on all the roads leading into Memphis would be very disastrous to all concerned should we have any weather demanding an unusual amount of coal. While there has been no scarcity of any particular grade, other than screenings, it has made these higher this season, than ever before.

BIRMINGHAM, ALA.

The usual holiday quietude prevails in the market for coal and coke and not much buying is anticipated until well after the new year.

Owing to the high prices now being obtained for all grades, a special effort was made by the operators to cut the loss of time, incident to the holidays, to a minimum. Many of the mines were, therefore, put into operation on Dec. 26 with a good quota of men ready for work.

Both domestic and foundry cokes are in urgent demand, and by adopting strenuous measures the coke plants were kept running full all through the holidays.

INDIANAPOLIS, IND.

The Indiana coal industry has progressed fairly well during the past week. With the exception of two holidays, the miners in nearly all the districts have worked full time. Operators say the demand is good, orders are being filled regularly and that little trouble is now experienced in securing cars for shipments. Retail and wholesale dealers report an even trade in all except anthracite coal; this has become a luxury in some markets. The Railroad Commission of Indiana has issued an order correcting and modifying rates to Lafayette and other points in the state and otherwise materially rendering assistance to the mining industry.

CHICAGO

As a result of the holiday season, there has been a temporary setback in the Chicago market, although prices, as a rule, remain steady. There is dullness throughout the domestic trade, but dealers believe there will be a resumption of brisk buying within a short time.

Hocking coal is being received in comparatively small consignments. Smokeless is stronger by from 15 to 20c. a ton than it was a week ago. Mine-run commands $1.50 and the price on lump and egg is about $2 a ton. Splint coal shipments are very light. Domestic lump is being sold for $2 at the mines. Orders for coke have lessened, although the producers have sufficient on hands to keep a full force at work for some time.

Prevailing prices at Chicago are:

	Sullivan Co.	Springfield	Clinton	W. Va.
4-in. lump	$2.87	.....	.....	.....
Domestic lump	.....	$2.32 @ 2.57	$2.52	.....
Egg	2.62	.....	.....	$4.30 @ 4.55
Steam lump	.....	2.12	2.17 @ 2.27	.....
Mine-run	2.07 @ 2.17	1.97	1.97 @ 2.02	3.45 @ 3.55
Screenings	1.62 @ 1.67	1.47 @ 1.57	1.57 @ 1.62	.....

Coke—Prices asked for coke are: Connellsville, $6.75@7; Wise County, $6.75@7; byproduct, egg and stove, $6@6.25; byproduct, nut, $6@6.25; gas house, $6.

DETROIT, MICH.

Conditions during the past week have not varied a great deal, even considering the usual holiday dullness. Anthracite is coming in plentifully, and the fact that we have had a mild season, and that nearly everyone stocked full of the softer coals in preparation for a hard winter and a prolonged strike, the price of same is only normal.

Coke, however, is a scarce article, even in all sizes and is commanding $5 at the ovens with scant possibility of getting any large amounts.

Local market conditions are as follows:

	W.Va. Splint	Gas	Hocking	Pitts. No. 8	Jackson Hill	Pocohontas
Domestic lump	$1.70	.....	.....	.....	$2.50	$2.75
Egg	1.70	.....	.....	.....	2.50	2.75
Nut	1.60	.....	$1.60	.....	.....	.....
¾-lump	1.40	$1.40	1.50	$1.40	.....	.....
Mine-run	1.25	1.25	1.35	1.30	.....	1.50
Slack	1.25	1.25	1.10	1.15	.....	1.25

The cold wave, expected about Christmas time, failed to show up, and the market consequently continued to break. The first of the year, however, saw a slight improvement, occasioned by the demand more than anything else, inasmuch as buying has been held off until the first. It is doubtful, however, as to whether coal will again see the prices this season that it did in the fall.

The car shortage and the slow movement of coal has been the only support the market has had, and as a matter of fact, it is the only thing that is keeping the price of coal above the cost of production right now. The anthracite situation is still tense as far as chestnut is concerned, but there is plenty of the larger sizes. Coke is extremely scarce, and the price continues to advance.

The prevailing prices are as follows:

	Carterville and Franklin Co.	Trenton and Big Muddy	Mt. Olive	Standard
2-in. lump	.....	.....	.....	$1.00 @ 1.10
3-in. lump	.....	.....	$1.40	.....
6-in. lump	.....	.....	1.60	1.25 @ 1.30
Lump and egg	$1.45 @ 1.60	$2.25	.....	.....
No. 1 nut	1.30 @ 1.50	.....	.....	.....
Screenings	0.75 @ 0.85	.....	.....	0.55 @ 0.65
Mine-run	1.10 @ 1.20	.....	.....	0.90 @ 1.00
No. 1 washed nut	1.50 @ 1.60	.....	.....	.....
No. 2 washed nut	1.35 @ 1.40	.....	.....	.....
No. 3 washed nut	1.15 @ 1.20	.....	.....	.....
No. 4 washed nut	1.05 @ 1.10	.....	.....	.....
No. 5 washed nut	0.85 @ 0.90	.....	.....	.....

Gas house and byproduct coke are quoted at $5.50, f..o.b. St. Louis.

OGDEN, UTAH

For the past two weeks the mines in Utah have been troubled with a car shortage, which from present indications promises to become quite severe. The Rio Grande R.R. has been putting forth an extra effort to handle the coal business tributary to its line and consequently a large percentage of its cars have gone to foreign roads and have not been returned.

Shortage of closed equipment on the Union Pacific is still acute and a very small portion of the domestic coal is being loaded in box cars. Operators are sending urgent requests to the trade to accept lump and nut in open cars. There is no relief in the labor situation and the mines are unable to reach maximum tonnage. No doubt this condition will continue throughout the remainder of the winter.

The cold weather has not affected the quotations f.o.b. mines, which are as follows:

	Wyoming	Utah
Lump	$2.75	$2.75
Nut	2.25	2.25
Mine-run	1.85	1.85
Slack	1.00	1.25

PORTLAND, ORE.

Portland is planning the installation of a system of coal bunkers for the accommodation of off-shore shipping and is now looking over the field for a satisfactory source of supply. In the past, large craft have found it advantageous to proceed to Puget Sound or British Columbia to fill their bunkers, at considerable additional expense, but the establishment of bunkering stations here will obviate this necessity. It is expected to bring the coal to the river in barges.

FOREIGN MARKETS

GREAT BRITAIN

Dec. 20—Colliery owners are still heavily booked; and they are holding firmly to quotations for all descriptions of large and small, for forward as well as prompt positions. Quotations are approximately as follows:

Best Welsh steam	$4.50	Best Monmouthshires	$4.20
Best seconds	4.26	Seconds	3.72
Seconds	4.20	Best Cardiff smalls	3.72
Best dry coals	4.38	Seconds	3.48

The prices for Cardiff coals are f.o.b. Cardiff, Penarth, or Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days—less 2½%.

PRODUCTION AND TRANSPORTATION STATISTICS

Pennsylvania Railroad

Statement of coal and coke carried on the P. R.R. Co.'s lines east of Pittsburgh and Erie during November and the first 11 months, with the increase or decrease over the same period last year, in short tons:

	November	Difference	11 Months	Difference
Anthracite	916,914	— 244,373	9,275,631	—1,466,713
Bituminous	3,934,876	+ 48,512	42,162,485	+3,724,526
Coke	1,245,500	+ 332,013	12,128,463	+2,400,327
Total	6,097,290	+ 136,152	63,566,579	+4,658,140

Connellsville Coke

The "Courier" reports production in the Connellsville region as follows:

Production	Week Ending Nov. 30	Dec. 7	Dec. 14	Dec. 21
Connellsville	218,546	214,990	212,890	228,563
Lower Connellsville	181,564	178,016	176,174	183,555
Totals	400,111	393,006	389,064	412,118
Shipments To	Cars	Cars	Cars	Cars
Pittsburgh	2,863	3,410	3,985	4,548
West of Pittsburgh	8,003	7,197	6,552	7,316
East of Region	998	1,019	1,015	964
Total	11,864	11,626	11,552	12,828

Norfolk & Western Ry.

The following is a comparative statement of the coal and coke shipments over the lines of the N. & W. Ry. for the month of November and the first 11 months of the years 1911-12, in short tons:

Destination	November 1911	1912	11 Months 1911	1912
Coal				
Tidewater, foreign	87,389	83,887	894,282	1,259,228
Tidewater, coastwise	303,873	239,476	2,790,824	3,325,067
Domestic	1,444,053	1,573,454	13,950,269	16,361,386
Coke				
Tidewater, foreign	8,489	.....	70,154	52,762
Domestic	118,351	136,912	1,317,997	1,282,093
Total	1,962,155	2,033,729	19,023,526	22,280,536

COAL SECURITIES

The following table gives the range of various active coal securities and dividends paid during the week ending Dec. 28:

Stocks

Company	High	Low	Last
American Coal Products	90	90	90
American Coal Products Pref	111	111	111
Colorado Fuel & Iron	34	33¾	33¾
Consolidation Coal of Maryland	103¾	103¼	103¾
Island Creek Coal Pref	87½	87½	87½
Lehigh Valley Coal Sales	240	240	240
Pittsburg Coal	24¼	23¼	23¾
Pittsburg Coal Pref	92½	89½	92
Pond Creek	26¾	26	26
Reading	168⅝	165⅞	166⅜
Reading 1st. Pref	90	90	90
Reading 2nd. Pref	93⅞	92½	92½
Virginia Iron, Coal & Coke	58	55	55

Bonds Company	Closing Bid	Asked	Week's Range or Last Sale		Year's Range	
Colo. F. & I. gen. s f g 5s	98	102	98	Dec. '12	97	100¾
Colo. F. & I. gen. 6s	....	....	107¼	June '12	107¼	107¾
Col. Ind. 1st & coll. 5s. gu	82¾	Sale	82½	84	72½	85¼
Cons. Ind. Coal Me. 1st 5s	80	84½	85	June '11	.....	..
Cons. Coal 1st and ref. 5s	....	94	93	Oct. '12	93	94
Gr. Riv. Coal & C. 1st g 6s	....	....	102⅝	Apr. '06	....	....
K. & H. C. & C. 1st s f g 5s	....	....	98	Dec. '12	97½	98½
Pocah. Con. Coll. 1st. s f 5s	87	88	88	Dec. '12	81½	89½
St. L. Rky. Mt. & Pac. 1st 5s	76	79½	79½	Dec. '21	79½	84½
Tenn. Coal gen. 5s	102½	103	103	103	101½	103¾
Birm. Div. 1st consol. 6s	102	103¾	102¼	Dec. '12	102½	104½
Tenn. Div. 1st g 6s	101½	103¾	101¼	Dec. '12	101½	104
Cah. C. M. Co. 1st g 6s	103½	110	110	Jan. '09	....	....
Utah Fuel 1st g 5s	....	....	....	....	....	....
Victor Fuel 1st s f 5s	....	83	85¾	Oct. '12	85¾	86
Va. I. Coal & Coke 1st g 5s	96	97	97	Dec. '12	94½	98½

Mahoning Coal R.R.—Dividend of $5 on the common, payable Feb. 1, to holders of record Jan. 10. On the preferred, 2½%, payable Jan. 2, to holders of record Dec. 24.

Del., Lack. & West. Coal Co.—Regular quarterly of 2½%, payable Jan. 15, to holders of record Dec. 31.

Pittsburgh Coal—Regular quarterly on the preferred of 1¼%, payable Jan. 25, to holders of record Jan. 15.

PRICES OF MINING SUPPLIES

THE MARKET IN GENERAL

The year 1913 opens far more auspiciously than did 1912. Manufacturers everywhere have orders on their books to keep them busily engaged for three or four months at least, while the prospect for new business is far better than at the same time in any year since 1907.

Iron and steel industries continue to furnish the greatest volume of orders, and the phenomenal increase in business taken by the U. S. Steel Corporation is marvelous. Every blast furnace, rolling mill, and finishing plant in the country is not only working full blast, but endeavoring to find additional men to turn out a larger product. Moreover, many of these mills are building extensive additions to care for future business.

Railroads of the country have purchased more liberally during the last month than at any time this year, and indications point to a continuation of this large amount of business for several months to come. Railway net earnings are increasing, and in good ratio. Of course, no man or corporation makes as much money as desired, but the profits of the railways are now fairly satisfactory.

Ship-building work is active, and promises to be more so. Freight rates have advanced rapidly in the last year, and even now ocean berth space is so scarce that few, if any, of the transatlantic carriers can offer cargo space for the next ten to twelve weeks. The railroads' conditions appear much the same. The shortage of cars, while not as apparent as a month ago, still exists, and in December, more cars were purchased than in any other month last year, while the railways on Jan. 1 were preparing to buy about 60,000 additional freight cars.

New terminals must be built by the railways, and additional facilities provided to take care of the enormous freight traffic.

Financial conditions have materially improved, and there is a healthy demand for money for mercantile purposes, entirely distinct from stock-market speculation.

LABOR

The differences between laborers and employers have, as a general rule, been readily adjusted, and, in fact, there have been only a few disturbances which required any outside interference. It rather prolonged strikes, the settlement of which was unnecessarily delayed by blundering on the part of the authorities.

Voluntary action on the part of the U. S. Steel Corporation in raising the wages of all of its employees after Jan. 1 seems to indicate that the officials of this corporation believe the present era of industrial prosperity will continue. It is estimated that the increased wages paid out by this company alone will amount to $5,000,000 annually.

In New York, on Dec. 30, about 75,000 garment workers went on strike. They are better organized than heretofore, and seem to have plenty of funds to carry on their campaign, backed by able leaders.

The Public Service Co., which controls a large part of the public utilities of the State of New Jersey, announced shortly before Christmas that hereafter no woman in its employ would receive less than $9 per week. On making this announcement, it stated that two-thirds of the company's female employees were affected by it.

In Boston the clerks of the New Haven railroad are striking for $2.25 per day.

IRON AND STEEL PRODUCTS

A better supply of coke in and around the Pittsburgh district, a more even distribution of cars, and the settlement of a small strike in Homestead mills all combine to make a larger production of steel products. While for the month of December, we usually present no records on account of the Christmas holidays, it is probable that in January several new high records of tonnage will be made, and it is furthermore probable that the record-breaking production which was established on several occasions in 1912 will be augmented from time to time.

Prices of steel products have changed slightly. Pig iron is practically the same as a month ago; semi-finished steel is likewise unchanged, but finished forms, such as plates and structural shapes, have been advanced $1 per ton.

Railway buying has continued in large volume. The principal transportation companies of this country bought more new equipment in December than in any month this year.

Inability to obtain shipments of bars, sheets and other finished material has caused more uneasiness than any other one thing this year.

The price of old material is considered an excellent index to the course of the market by experienced iron and steel men. The highest prices recorded in 1912 were reached around the first of November, but a month after that, prices declined with little show of resistance. During December sales was larger, but there was practically no improvement in prices. The outlook now is not especially bright.

Orders for rails placed for 1913 by railroads in 1912 will probably exceed 2,500,000 tons. The total requirements of the railroads for the present year will undoubtedly total 4,000,000, and to roll this vast quantity will tax the capacities of the mills. It is true that the rolls of the country had a capacity in the neighborhood of 5,000,000, and perhaps somewhat in excess of this, but that was several years ago, and since that time these mills have been equipped with different rolls; to change them over again would require a great expenditure.

Rails—Several good export orders came up during December; one for 100,000 tons for Brazil, which, however, was not closed. Another order of 19,000 tons for South America was accepted. Quotations are unchanged, with a continued scarcity in the lighter-weight rails, and, f.o.b. Pittsburgh, are as follows: Standard sections, 6 to 100 lb. per yd., 1.25c. per lb.; 40 to 50 lb., 1.21c.; 12 lb., 1.25c. Relaying rails in Chicago, 45 lb., subject to inspection, are held at $22 to $24 per ton. Standard sections of relaying rails in the same market are held at $24 per ton. Some of these rails can be had at points other than Chicago.

Track Supplies—A scarcity seems to exist in track bolts and prices have been moved upward. In Pittsburgh, 2.05c. per lb. is quoted. Angle bars are in plentiful supply and 1.50c. per lb. is named in Pittsburgh. In Chicago, angle bars are 1.50c.; spikes, 1.75 to 1.95c.; track bolts with square nuts, 2.30 to 2.40c.

Structural Material—Mills rolling structural shapes and track material have all the orders on their books that they can take care of for the next six months, and in spite of an advance of $1 per ton, made in the latter part of December, there seems to be no diminution in the amount of business offered. While the mills making plain material are crowded, the fabricating shops are working to the limit of capacity, and now have orders on their books which will carry them well through the summer. Of course, some rush jobs can be taken care of in the meantime, but for ordinary roof trusses and the like, there seems to be no possibility of getting material for six months, unless fancy prices are paid for it. Prices, as stated, are $1 per ton higher, ordinary angles, beams, channels and tees being quoted at 1.55 to 1.60c., f.o.b. Pittsburgh, for deferred shipments and 1.75 to 1.80c. for fairly prompt delivery. In Chicago, quotation for future shipment is 1.68 to 1.78c., and for fairly prompt delivery, 1.88 to 1.93c. The enormous buying of cars by the railroads as well as the orders by shipbuilding firms resulted in stiffening the prices of plates which are now quoted at 1.55 to 1.60c., Pittsburgh, for future delivery, and 1.75 to 1.80c. for fairly prompt. In Chciago, the price for future shipment is 1.68 to 1.73c., and for delivery in the near future, 1.88 to 1.93c.

Mine Timbers—The demand for mine timber has not been up to the expectation of the mills rolling these special shapes and the tonnage disposed of was disappointing. Makers of mine timbers, however, have sufficient stock on hand to supply the limited need, and prices are steady and unchanged at 1.50 to 1.55c., Pittsburgh.

Pipe—A revision in the list of pipe announced by manufacturers on Jan. 1, resulted in slight changes being made in the price of practically all different sizes. Most of the makers of pipe have discontinued the manufacture of merchant sizes, and all pipe will now be standard. Discounts are as follows: Steel pipe, ½-in., large lots from the mill, black, 77% from list; galvanized, 66⅔%; ¾- to 3-in., black, 80%; galvanized, 71⅔%; 2-in., black, 77%; galvanized, 68⅔%; 2½- to 6-in., black, 79%; galvanized, 70½. Based on these discounts, the net prices of pipe per foot are as follows, in cuts:

Size, inches	Black	Galvanized
¾	2.30	3.40
1	3.40	4.85
1¼	4.60	6.55
1½	5.50	7.70
2	7.40	10.30
2½	11.50	16.70
3	15.40	21.75

Sheets—Sheet makers are beset with many difficulties in pleasing their customers. For blue annealed sheets, 14 to 16 weeks' delay is experienced, while on the better known sizes of black and galvanized sheets, from 10 to 14 weeks, and on sheets generally used for automobile purposes, there is a delay of 12 to 16 weeks. Specifications continue larger than the mills can turn out, and the total purchase of sheets increases rather than diminishes. On Dec. 31, many long-time contracts expired, and these were taken at much lower prices. Sheet mills expect considerably better prices after the first of the year, with a volume of business fully equal to that of the last three months. In general, prices are steady without change, but small mills, which make prompt shipments, are able to command fancy prices for this accommodation.

The following table gives the price of sheets in carload lots, f.o.b. the Pittsburgh district, and also the price of small lots from store in Chicago:

	Cents per pound			
	Pittsburgh		Chicago	
	Black	Galv.	Black	Galv.
Nos. 22 to 24	2.10	2.90	2.50	3.20
Nos. 25 and 26	2.15	3.10	2.60	3.45
No. 27	2.20	3.25	2.65	3.65
No. 28	2.25	3.40	2.70	3.90

WIRE PRODUCTS

Wire—Continued efforts have been made to advance the quotations of wire, as were noted last month, but the largest manufacturers have strenuously opposed such a course, and they have been successful in their attitude. This does not mean that there is no expectation of an advance in the near future, for it is the unanimous opinion among manufacturers that an upward revision of quotations must be made before spring. Plain barbed wire is $1.75@1.80, f.o.b. Pittsburgh, and galvanized is $2.10@2.15. Annealed fence wire is $1.55@1.65, and galvanized is $1.95@2.05. All of these quotations are per 100 pounds.

Wire Rope—Some large orders have recently been placed for wire rope, and a notable export order was for 6000 ft., to be shipped to Cuba to haul 100,000-lb. cars. Samples of this rope were tested by machines, and broke under a strain of 600,000 lb. There does not seem to be the same scarcity that existed a month ago. Net prices of the sizes in most general use are quoted, f.o.b. Pittsburgh: 2-in., 57@76c. per ft.; 1¼-in., 23@32c. per ft.; ¾-in., 10@13c. per ft. All of these prices are for large lots.

Telegraph Wire—The demand for telegraph wire has been large. For lots in fair size, the wire measured in Birmingham wire gage, prices are as follows: "Extra Best Best," Nos. 6 to 9, 4⅜c.; Nos. 10 and 11, 4½c.; No. 12, 4⅝c.; No. 14, 5⅛c.; "Best Best," Nos. 6 to 9, 3½c.; Nos. 10 and 11, 3⅝c.; No. 12, 3½c.; No. 14, 4c. Actual freight is allowed from basic points where it does not exceed 25c. per 100 pounds.

Copper Wire—Manufacturers of copper wire had a very satisfactory business all last year, and while they are somewhat behind on shipments, as a general rule these are made promptly. Prices are firm, at 18¾@19c. base, depending on the size of the order.

MINE SUPPLIES

Nails—The price of nails did not advance, but it is felt that an advance will be made within the next month or so. The following quotations are per keg of 100 lb., f.o.b. the points named: Wire nails, Pittsburgh, $1.85 base. In Chicago, the base price is $2.08 for wire nails, and in Pittsburgh, less than carload lots are quoted at $1.85. Cut nails are held at $1.80 in Pittsburgh for jobbing lots.

Bar Iron and Steel Shapes—Consumers ordering direct from the mill find it difficult, if not impossible, to secure shipments with any degree of regularity, and in consequence, much of this material is ordered from jobbers' stocks. The prices from jobbers' store in cents per pound, f.o.b. Chicago, are as follows:

	Cents per lb.
Refined Iron:	
1 to 1½ in., round and square	2.05
1½ to 4 in. x ¾ to 1 in.	2.05
1½ to 4 in. x ½ to 5/16 in.	2.25
Norway bars	3.60
Soft Steel:	
¾ to 3 in., round and square	2.05
1 to 6 in. x ¾ to 1 in.	2.05
1 to 6 in. x ½ and 5/16 in.	2.20
Rods—⅜ and 11/32 in.	2.15
Bands—1½ to 6x1/16 to No. 8	2.35
Beams and channels—3 to 15 in.	2.25
Angles;	
3 in. x ¼ in. and larger	2.25
3 in. x 5/16 in. and ¼ in.	2.60
1½ to 2½ in. x ¼ in.	2.35
1½ to 2½ in. x 5/16 in. and thicker	2.25
1 to 1¼ in. x 5/16 in.	2.35
1 to 1¼x¼ in.	2.40

Belting—Manufacturers of belting have all the business they can take care of for the time being, and the prospects are excellent. There has been a slight falling off in the demand for leather for other purposes, and in consequence, discounts are unchanged from last month. These discounts may be found on page 482 of the issue of Oct. 5. Net prices per foot for various widths of leather belting are as follows:

LEATHER BELTING, NET PRICE PER FOOT

Width inches	Extra heavy	Heavy	Light
1	$0.11	$0.10	$0.08
1½	0.17	0.14	0.11
2	0.23	0.19	0.15
2½	0.28	0.24	0.19
3	0.34	0.29	0.23
3½	0.40	0.34	0.27
4	0.46	0.38	0.31

Brattice Cloth—Quotations continue at a high level. In fact, prices today are on a higher basis than ever before. This is caused by a phenomenal demand for all kinds of jute products, in addition to an enormous inquiry for brattice cloth itself. Shipments are somewhat better, and deliveries can be made in shorter time than a month ago, while stocks in the United States have increased slightly. This is a relief in point of view of shipment only, for lower prices are not looked for by conservative dealers in the trade for six months to come, at least.

Packing—Prices vary within wide limit, according to the brands of various dealers, but in general, packing can be purchased at the following quotations: Asbestos wick and rope, 13c. per lb.; sheet rubber, 11 to 13c.; pure gum rubber, 40 to 45c.; red sheet packing, 40 to 50c.; cotton packing, 16 to 25c.; jute, 5 to 6c.; Russian packing, 9 to 10c.

Chain—Mills seem to have caught up with their orders, but the revision of prices announced two months ago has had no effect on the volume of inquiries and many of these will subsequently be turned into orders. Prevailing quotations per 100 lb., f.o.b. Pittsburgh, are as follows:

5/16 in.	$7.50
¼ in.	4.95
3/16 in.	3.95
⅜ in.	3.40
7/16 in.	3.20
½ and 9/16 in.	3.00
⅝ and 11/16 in.	2.90
¾ and 13/16 in.	2.80
⅞ and 15/16 in.	2.70
1 to 1¼ in.	2.60
Extras for BB	
5/16 in.	1.50
¼ in.	1.50
5/16 in. and larger	1.25
Extras for BBB	
5/16 and ¼ in.	2c.
5/16 and larger	1.75c.

CONCRETE AGGREGATES

Portland Cement—While prices are unchanged from last month, the market is undeniably stronger. Makers of portland cement are looking forward to this year's being the most satisfactory of any in the cement industry. Eastern markets, which have been lagging behind for the last five years, are the most hopeful. There, a large amount of business is already in sight, and indications are not wanting that much more will develop, if conditions are at all favorable. All things considered, it would not be at all surprising if the price of cement should be advanced in the latter part of February, or slightly later, and revised on a basis of 10 to 20c. per bbl. higher. At present, quotations are unchanged, as stated, at $1.58 per bbl., f.o.b. Pittsburgh, subject to the regular allowance of 10c. for all bags returned. In wood, cement is quoted at $1.58 per bbl., at the same place.

Bars, Concrete Reinforcing—The inability to secure direct shipments of bars from the mills has caused many consumers to buy warehouse stocks, and in consequence, there is a premium of $4 to $6 per ton for such stock. Shipments cannot be made within three to four months on any kind of material from mill, and in some cases it is even longer.

The following quotations are named, f.o.b. Pittsburgh, for large lots from mill, also for small lots from warehouse stock:

Pittsburgh prices in cents per pound.

	Mill shipments	Warehouse stocks
¾-in. and larger	1.45@1.50	1.95@2.05
⅝-in.	1.50@1.60	2.00@2.10
½-in.	1.55@1.65	2.05@2.15
⅜-in.	1.65@1.75	2.20@2.30
¼-in.	1.95@2.05	2.45@2.55

Triangular Mesh—This form of concrete reinforcement is selling at unchanged prices, and the makers state that they are able to make delivery in a day or so after the receipt of order.

From mill in De Kalb, Ill., quotations are 18c. per 100 lb. higher. Prices are as follows, per 100 sq.ft., f.o.b. Pittsburgh district, for less than carload lots and lots of more than 10,000 sq.ft.:

No. 4	$1.23	No. 32	$2.62
" 23	2.05	" 36	1.05
" 26	1.42	" 40	3.25
" 28	1.97	" 41	2.48

Petroleum Products—Much higher prices prevail for crude oil from well. In fact, the advance in December was as rapid as any month this year. For example, Pennsylvania is now quoted at $2.07 per bbl., compared with $1.30 at the beginning of the year; Second Sand and Tiona, $1.90; Mercer black and New Castle, Corning, $1.53; Illinois, above 30 gravity, $1.08; Kansas and Oklahoma, 83c. All these prices are for the crude oil at the wells per barrel. A revision has been made in the price of kerosene, and it is now being quoted at 9c. per gal. Auto naphtha is 19¾ cents.

Paints—A further revision in the price of linseed oil brought the quotation down to 46c. per gal. in the principal market. Paints have not followed the decline, but in a general way paint is cheaper, and there are few adulterants used in the mixing of it. The amount of low-grade oils which has been used in the cheaper grades of ready mixed paints during the last few years is amazing, and the great trouble is that their imperfections do not appear for six months or so after a structure has been painted. In consequence, all bills have been paid, and there is no redress.

Spirits of turpentine is also slightly easier at 35c. to 36c. per gal. White lead in oil in 100-, 250- and 500-lb. kegs is 6½@7c. per pound. Red lead and litharge in lots of 500 lb. and over may be obtained at 7 cents.

Insulators—Prices continue with out change. Glass insulators in lots of 1000, and less than 10,000, are sold at the following price per 1000: Double petticoats, 20-oz., $33; Western Union, $30.25; No. 2 cable, $53.90; No. 4 cable, $2.10; Muncie type, 7-in., $236.50; No. 3 triple petticoat, 4½-in., $90.75.

Sheet Steel Roofing—The same scarcity which is noted in the market for ordinary sheets is felt in the corrugated-sheet market. Prices are irregular, but from store, Chicago, are as follows per 100 sq.ft. for 2½-in. corrugation, painted: No. 22, $4.75; 24, $3.75; 26, $2.85; 28, $2.50. Galvanized roofing is held at an advance of 10c. per 100 lb. over the flat sheets from which they are made. For example, 24-in. galvanized roofing in Chicago would be $3.75 per 100 lb.; 28-in. galvanized, $4.20 per 100 lb.